# **4200 Series Flow Meters**

Accurate flow measurement that's versatile and easy to use





## **4200 Series Open Channel Flow Meters**

When you need a monitoring system that's accurate, versatile, and easy to use, turn to open channel flow meters from Isco. Our 4200 Series is backed by 30 years of experience in flow measurement. You can depend on Isco technology to meet your needs in an increasingly complex monitoring environment.

#### **Maximum Accuracy**

Nothing else matters if your flow meter can't measure flow accurately. But inaccuracies result when a single measurement technology is used in a variety of applications. The 4200 Series offers you a choice of four measurement technologies, so you can select the flow meter best suited for your site conditions.

#### **Maximum Versatility**

Today, you need a monitoring system with the versatility to perform in a variety of situations. For example, you may be required to collect flow-proportioned samples. Or you may be required to monitor parameters such as pH, conductivity, or temperature. In storm water monitoring, you need to measure rainfall. You may need to be notified when an alarm condition occurs. And, in many applications, you need to control a process, such as chlorination and pH neutralization.



Convenient options customize the 4200 Series for your specific portable and fixed-site applications including:

- Pretreatment Compliance
- Storm Water Runoff Monitoring
- Permit Enforcement
- Sewer Flow Monitoring
- Combined Sewer Overflow Studies
- Wastewater Treatment Plant Operations
- Inflow And Infiltration Studies
- River And Stream Gauging

## User-friendly Programming and Data Collection

## **Fast and Easy Programming**

The 4200s are so easy to program, you'll rarely need the instruction manual. Just use the tactile keypad to respond to simple questions on the two-line, 80-character LCD. For added convenience, the LCD is backlit, so it's easy to read – even in the darkest manholes.

The 4200 Series contains built-in flow conversions for most applications, or you can enter data points or an equation for special situations. When programming is complete, data is displayed in selectable units of measure.

## **Exclusive Built-in Printer**

Our 4200 Series Flow Meters give you a choice of technologies for collecting data. A built-in dot matrix printer gives you an accurate, on-site printout of monitoring data. The printer plots up to three lines of data, plus rainfall and samples. Simple, easy-to-read summary reports are printed on command or at selected time intervals. You can also print the flow meter program on command.



Isco's Flowlink Software produces a variety of informative graphs and reports from your stored data.



The exclusive built-in printer provides easy-to-read charts and summary reports.

## **Powerful Data Storage**

The 4200 Series also features internal memory to store over 2 months of flow, rainfall, parameter and sample data at 15 minute intervals. You can retrieve stored data on-site with a laptop PC, an Isco 581 Rapid Transfer Device, or remotely – via telephone modem and our 2102 Wireless Module. Isco Flowlink<sup>®</sup> software uses stored data to generate informative graphs and reports.

## **Convenient Alarm Messages**

In addition to transferring stored data over telephone lines, our telephone modems have voice messaging capabilities. Now your flow meter can notify you when programmed alarm conditions occur, eliminating the need for a separate dialer.



## Choose the Best Technology For Your Applications

No single technology is suitable for all open channel flow measurement applications. Isco offers you a choice of ultrasonic, submerged probe, bubbler, and area velocity flow meters. The 4200 Series includes the 4210 Ultrasonic, 4220 Submerged Probe, 4230 Bubbler, and 4250 Area Velocity Flow Meters. Now you can choose the most accurate technology for each of your monitoring sites.

Please refer to the Flow Measurement Technology Selection Guide on the back cover for more information.

**4210 Ultrasonic**—for flow measurement in streams containing harsh chemicals, grease, or suspended solids. The ultrasonic sensor is mounted above the flow stream and requires no scheduled maintenance. The 4210 measures the level in the channel by transmitting a sound pulse from the sensor and measuring the time for the echo to return from the flow stream surface. The level is then converted into flow rate. **4220 Submerged Probe**—ideal for sites where wind, steam, foam, or turbulence exist. The probe is mounted at the bottom of the channel and measures the pressure of the liquid above the probe to determine the depth of the flow stream. The 4220 converts the level reading into flow rate.



**4230 Bubbler**—resists damage by lightning, debris, and corrosive flow stream chemicals. The 4230 uses an internal air compressor to force air from a bubble tube submerged in the flow stream. The depth of the flow is determined by measuring the pressure needed to force bubbles out of the line. The 4230 then converts this depth into flow rate.

4250 Area Velocity—for sites where submerged, surcharged, full pipe, or reverse flow conditions may occur. The 4250 sensor is mounted at the bottom of the channel and uses Doppler technology to directly measure average velocity throughout the flow stream. An integral pressure transducer measures depth to determine flow area. The 4250 calculates flow rate by multiplying the area of the flow stream by the average velocity.



## **More Than a Flow Meter**



#### Water Quality Monitoring

In addition to measuring flow rate, Isco 4200 Series Flow Meters can continuously monitor important water quality parameters. Simply connect an Isco 201 pH/Temperature Module to your 4200 Series Flow Meter.

#### **Parameter Module Specifications**

201 Parameter Module		Temperature Probe				
Size (L x W x D)	8.5 in x 4.75 in x 3.5 in	21.6 cm x 12.1 cm x 8.9 cm	Precision linear thermistor enclosed in stainless steel housing.			
Weight	2.5 lbs	1.1 kg	Size (L x D) 2.5 in x 0.55 in 6.35 cm x 1.4 cm			
Material	Structural foam molded polys	tyrene	Cable Length	25 ft	7.6 m	
Enclosure	NEMA 4X	IP65	Range	32 to 176°F	0 to 80°C	
Power	10 to 14V DC, 10 mA Maximu (supplied by 4200 Series Flow	um v Meter)	Accuracy Materials	±1.8°F	±1°C	
Cable Length (module to flow meter)	15 ft (4.6 m) standard, 1000 f	t (305 m) maximum	Probe	Type 316 stainless steel		
Operating Temperature	32 to 158°F	0 to 70°C	Cable	Polyvinyl chloride (PVC)		
Storage Temperature	-4 to 158°F	-20 to 70°C				
pH Probe						
Submersible, vertical or horizontal-mounting probe with combination type electrodes; single or double porous Teflon® liquid junction to resist fouling and coating. Steam-sterilized glass hemi-bulb for long-term stability. Built-in amplifier and internal exposed temperature probe for stability and fast temperature response.						
Size (L x D)	6 in x 1.12 in	15.2 cm x 2.8 cm				
Cable Length	25 ft	7.6 m				
Range	0 to 14 pH					
Accuracy	±0.1%					
Operating Temperature	32 to 230°F	0 to 110°C				
Storage Temperature	32 to 230°F	0 to 110°C				
Materials						
Probe	316 Stainless Steel					
Cable	Polyvinyl chloride (PVC)					

## **Flexible Control and Communication**

The 4200 Series offers up to 3 internal analog outputs, allowing you to control processes and drive external equipment. Each output can be scaled based on any flow or parameter measurement, and can also be manually controlled to test the operation of connected equipment.

The 4200s also feature a serial output to communicate with computers, SCADA networks, and similar systems. Current status and readings are transmitted in response to a command, or automatically at selected time intervals.

## **Easy to Upgrade**

Nonvolatile flash memory makes it easy to use the latest software in your flow meters. You can easily reprogram this memory using a PC, without opening the flow meter or returning it to the factory.

## **Variety of Power Sources**

Isco offers a variety of power sources to meet your specific needs. Select from nickel-cadmium or lead-acid batteries for portable flow monitoring. Solar panels are also available to maintain the charge on a lead-acid battery.



Connect a sampler for flow proportioned sampling, or a rain gauge for stormwater runoff monitoring. The flow meter can activate the sampler based on flow, parameters, and/or rainfall.

Isco power packs are used in applications where AC power is available. The Battery-backed Power Pack features a built-in battery to power your flow meter when AC power is lost.

## **Rugged Enclosure**

Isco 4200 Series Flow Meters are engineered for portable or fixed-site flow monitoring. Their enclosures meet NEMA 4X and IP65 requirements for watertight, dust-tight, and corrosion resistant operation. This ensures dependable operation in the harshest environments.

## **YSI 600<sup>®</sup> Specifications**

YSI 600					
Length	14 in	35.6 cm	Conductivity Parameter	Conductivity, specifi	ic conductance,
Diameter	1.6 in	4.1 cm	-	salinity, or total diss	olved solids*
Weight (with bulkhead connector and stainless steel nose weight)	1.4 lbs	0.63 kg	Conductivity Measurement Range Desclution	0 to 100 mS/cm	
Power (supplied by 4200 Series Flow Meter or 6700 Series Sampler)	12V DC		Accuracy	±0.5% of reading of whichever is greate	r ±0.001 mS/cm, r
Cable Integral	25, 50, 100, or 200 ft	7.6, 15.2, 30.5, or 61.0 m	- Salinity Measurement Range Resolution Accuracy	0 to 70 ppt 0.1 ppt +0.2 ppt	
Field Cable (for use with YSI 600 with bulkhead connector)	8, 25, 50, or 100 ft standard, 1000 ft maximum	2.4, 7.6, 15.2, or 30.5 m standard, 305 m maximum	Temperature Measurement Range	23° to 113°F	-5° to 45°C
Media	Freshwater, seawate	r, and wastewater;	Accuracy	±0.27° F	±0.15°C
pH Measurement (optional)	not designed for full	sonago	<ul> <li>Operating Temperature</li> </ul>	23° to 113°F	-5° to 45°C
Range Resolution	0 to 14 pH 0.1 pH +0.2 pH		Storage Temperature With pH Probe Without pH Probe	14° to 140°F -40° to 140°F	-10° to 60°C -40° to 60°C
Reference Electrode Dissolved Oxygen	Field-replaceable, sc	rew-in module	Materials Sonde	Polyvinyl chloride (F	PVC), steel
Probe Type Range Resolution	Rapid-Pulse 0 to 20 mg/l 0.1 mg/l		Cable Bulkhead Connector (optional)	Polyurethane Type 316 stainless	steel
Accuracy	±0.2 mg/l		* Specific conductance [conductivit are automatically calculated from Methods for the Examination of W	y corrected to 77°F (25°C conductivity according to ater and Wastewater.	C)] and total dissolved solids algorithms found in Standard



YSI 600 Multi-Parameter Water Quality Monitor

# 4210 Ultrasonic Flow Meter



The 4210 Ultrasonic provides non-contact sensing of the flow over a weir.

The sensor on the 4210 Ultrasonic Flow Meter is mounted above the flow stream. It transmits a sound pulse that is reflected by the surface of the flow. The elapsed time between sending a pulse and receiving an echo determines the level in the channel. A built-in temperature sensor automatically compensates for changes in air temperature to ensure measurement accuracy.

#### **Non-contacting Sensor**

Because its sensor does not contact the liquid, the 4210 provides long-term dependability with no scheduled maintenance. The Isco 4210 is not affected by chemicals or high concentrations of grease, suspended solids, or silt in the flow.

#### **Accurate Under Tough Conditions**

The 4210 automatically adjusts amplifier gain in response to echo strength. This patented\* technology maximizes performance in the presence of steam, foam, and turbulence. Our Variable Blanking Distance feature eliminates false echo problems caused by obstructions such as manhole rungs or the top of a flume.

## Isco 4210 Specifications

Size (# X UD) (whot power source)       15 Sin X 11 Sin X 15 In X 15 I	FIOW MELEI			_			
Weight Guida grows source Interval per local center Parket Power       17.3 bs       7.8 bs       7.8 bs         Metainal Enclosure (solt center)       17.3 bs       17.8 bs	Size (H x W x D) (without power source)	15.5 in x 11.5 in x 10.5 in	439.4 cm x 29.2 cm x 26.7 cm	Data Storage Memory Capacity	80,000 bytes (approximately 40	0,000 readings) divided into	
National         High-ingract mode polysperse structuration         Professional Control (Professional Control (P	Weight (without power source)	17.3 lbs	7.8 kg		a maximum of 12 memory partitions; equal to 100 days		
Enclosure (self-cetting)         NEMA kt         Let / L         Proces         Readings at 15 minute intervals plus 3000 (printer set stal 1 hbr (2.5 cm/h) and 1 minute level mainting interval)         Final set	Material	High-impact molded polystyrer	e structural foam		of level, rainfall, pH, DO, conductivity, and temperature		
Power         12 htt 10 DC, 24 mA everge at 125V DC (prints set at 1 br/ts 25 mbr/ta) at Timble beviet anding interval control interval 20 at Kitack Cambra mattering 220 bigs bigs bigs bigs bigs bigs program Memory         South and Timble beviet anding interval 20 at Kitack Cambra mattering 220 bigs bigs bigs bigs bigs program Memory         South and Timble beviet control interval 20 at Kitack Cambra mattering 240 bigs bigs bigs bigs program Memory         South and Data Ruthived 20 bigs bigs proveretoreto program 20 bigs bigs big	Enclosure (self-certified)	NEMA 4X	IP65		readings at 15 minute intervals,	plus 3,000 sample events.	
at 1 why (2.5 cm/s) and 1 minute level and planced         Section 4 decempoint         Section 4 decempoint           Ypickel Battery Life         (price 3 decempoint)         Dire Commercian coption al itemal 2400 bps belighting           24 Notes/Carling Data         (Dire Commercian coption al itemal 2400 bps belighting         Dire Commercian coption al itemal 2400 bps belighting           24 Notes/Carling Data         (Dire Commercian coption al itemal 2400 bps belighting         Dire Commercian coption al itemal 2400 bps belighting           24 Notes/Carling Data         (Dire Commercian coption al itemal 2400 bps belighting         Dire Commercian coption al itemal 2400 bps belighting           24 Notes/Carling Data         (Dire Commercian coption al itemal 2400 bps belighting         Dire Commercian coption al itemal 2400 bps belighting           24 Notes/Carling Data         (Dire Commercian coption al itemal 2400 bps belighting         Dire Commercian coption al itemal 2400 bps belighting           24 Notes/Carling Data         (Dire Commercian coption al itemal 2400 bps belighting         Dire Commercian coption al itemal 2400 bps belighting           24 Notes/Carling Data         (Dire Commercian coption al itemal 2400 bps belighting         Dire Commercian coption al itemal 2400 bps belighting           24 Notes/Carling Data         (Dire Commercian coption al itemal 2400 bps belighting         Dire Commercian coption al itemal 2400 bps belighting           24 Notes/Carling Dates/Carling Dates/Carling Data         Dire Commercian cop	Power	12 to 14V DC, 24 mA average	at 12.5V DC (printer set	Sature and Data Datriaval	loss Flowlink® coffware		
Typical Battory Life         (printer set at 1 min / 2 S m/b) and 1 minute level reading (inval)         Communication         (Diffuture)         (Diffuture) </td <td></td> <td>at 1 in/hr (2.5 cm/hr) and 1 min</td> <td>ute level reading interval)</td> <td>Setup and Data Retrieval</td> <td colspan="2">TISCO FIOWINK<sup>®</sup> SOftware</td>		at 1 in/hr (2.5 cm/hr) and 1 min	ute level reading interval)	Setup and Data Retrieval	TISCO FIOWINK <sup>®</sup> SOftware		
Participation         Partin         Participation         Participation </td <td>Typical Battery Life</td> <td colspan="2">(printer set at 1 in/hr (2.5 cm/hr) and 1 minute level</td> <td>Communication</td> <td colspan="2">Direct confriending, optional internal 2400 bps telephone modem with voice messaging: or optional spread</td>	Typical Battery Life	(printer set at 1 in/hr (2.5 cm/hr) and 1 minute level		Communication	Direct confriending, optional internal 2400 bps telephone modem with voice messaging: or optional spread		
914 Michail Cadmim Battery     7 16 8 days     7 16 8 days     2 10 8 days       948 Load Acid Battery     10 10 2 days     Voice Messaging     Voice Messaging       948 Load Acid Battery     40 10 2 days     Work Messaging     Voice Messaging       948 Load Acid Battery     60 10 75 days     Work Messaging     Voice Messaging       948 Load Acid Battery     8 dati LCD. 24 he. 80 character (5.5 mm high x 3.2 mm vide)     Analog Outputs (optional)     Use batter cade, and the practice and the	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	reading interval)			spectrum wireless module	or optional spicad-	
494 Lead Acid Ballery     10 to 12 days     Viola 12 days       495 Lead Acid Ballery     00 to 75 days       Program Memory     Non-voldille, programmable flash: can be updated via interrugation prof without operating the endoscenee     Calis up to 5 stephone numbers with programmable delay with optional internal delay to a delay to 20 model.       Display     Bodit LCD. 2-Ine, 80-channeter (5.5 mm htp x 3.2 mm vide)     Analog Outputs (optional)     Up to 3 stabilized internal outputs, 10 to 20 mA or 4 to 20 mA, stabilized internal outputs, 0 to 20 mA or 4 to 20	934 Nickel-Cadmium Battery	7 to 8 days		Data Retrieval (optional)	Isco 581 Rapid Transfer Device	e (RTD)	
448.1 cal. Acid Baltery       60.10.75 days       (with cytorial literard literard literard literation of the constraint of t	946 Lead-Acid Battery	10 to 12 days		Voice Messaging	Calls up to 5 telephone number	rs with programmable delay	
Program Memory         Non-valalite, programmable flash- can be updated via interprotection of any two of level, flow rate, central, pH DO, conductivity, and Temperature         of any two of level, flow rate, central, pH DO, conductivity, and Temperature           Display         Bodit LCO, 2-line, 80-character (5.5 mm high x 32 mm wide)         Analog Outputs (optional)         Lip to 3 stated iteration uputs, 0.10 20 mA or 4 to 20 mA, stated based on level, flow rate, central, pH DO, conductivity, and temperature, into a maximum of 750 ohnes each.           Wers         V notch: rectangular with and without end contractions, Cipated it         Cipated it         Concerts state, and readings, in response to command or automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate points to automational without sets of 20 evel flow rate automational without sets of 20 evel fl	948 Lead-Acid Battery	60 to 75 days		(with optional internal	between calls, activated based of	on AND and OR combinations	
Display         Baditt LC2, 24e, 80-character (5.5 mm high x 32 mm wide)         Analog Outputs (optional)         Up to 3 scalade diversion of 0.4 or 4 of 20 mA. scalade based on iver, flow rate pAD. Octouchtly or temperature, into a maximum of 750 ohnes each flumes         Particle (5.5 mm high x 32 mm wide)           Weits         V notch, rectangular with and without end contractions, Cipuletil         Relay Outputs         (2 prim C relays with field selectable tilp points based on flumes being points based on flumes         (2 prim C relays with field selectable tilp points based on flumes being points based flumes based being points based flumes based based baseathase based flumes baseatebased flumes based based	Program Memory	Non-volatile, programmable flat interrogator port without openir	sh; can be updated via ng the enclosure	telephone modem)	of any two of level, flow rate, ra and temperature	infall, pH, DO, conductivity,	
Level-to-Flow Rate Conversions         Scaleable based on level, flow rate, pH, DO, conductify, or temperature, iho anaxymm of 750 ohnes each           Weis         Vnoth, rectangular with and without end contractions, Cipotelin         Relay Outputs         2/orn C relays with field selectable they points based on flow rate (with optional HighLow Alarm Relays)           Fumes         Parshall, Paime-Bowkas, Leopoid-Lagoo, Trapezoidal, H, HS, HL         Serial Output         Current Status and readings, in resporse to command or automatically a selectable time intervals, ASCII comma separature via automatically a selectable time interval, Fauntical provide via the selectable time intervals, ASCII comma separature via the selectable time interval reports (bio via to conditivity, and temperature (vith optional VSI AGO Mail-Parameter (Water Cuality Montri); pH and temperature (with optional ISco 201 Parameter Module)         Up to 3 (mail and the selectable time interval reports (bio wrate, rathing and tothe number Printer         0.0 10.1         0.3 m           Sampler Pacing Output         Event mark, botte number         Event mark, botte number         Span	Display	Backlit LCD, 2-line, 80-character (	(5.5 mm high x 3.2 mm wide)	Analog Outputs (optional)	Up to 3 isolated internal outputs	s, 0 to 20 mA or 4 to 20 mA,	
Weis         Vnoth, rectangular with and without end contractions, Cipoletii         Relay Outputs         2 form C relays with field selectable hitp points based on Dow rate (with optional High) con Alarm Relays)           Flumes         Parshall, Paimer-Bowkis, Leopold-Lago, Trapezoidal, H, HS, HL         Serial Output         Current status and readings, in response to command or automatically at selectable time intervals, ASCII comma Separated values at 1200, 200, 4800, or Wold bps           Data Points         Four sets of 50 level-flow rate points         Operating Temperature         0° to 140° F         -18° to 60° C           Data Points         Four sets of 50 level-flow rate points         Storage Temperature         -40° to 140° F         -40° to 60° C           Contact Closure, normally open         Contact closure, normally open         Cable Length         4.0° to 140° F         -40° to 60° C           Resolution         0.0° to 0.000 in         [0.25 or 0.1 mm         Cable Length         2.5 ft.         7.6 m.           Resolution         0.0° to 0.000 in         [0.25 or 0.1 mm         Cable Length         2.5 ft.         7.6 m.           Resolution         0.0° to 0.000 in         [0.25 or 0.1 mm         Cable Diameter         3.6 in         9.1 cm           Sampler fuput         Event mark, both pupute Water Cuality Monitor; PF and temperature (Mith optional ISS oo 201 Parameter Module)         10.6 Cam         0.3 m         0.3 m	Level-to-Flow Rate Conversions				scaleable based on level, flow temperature, into a maximum of	rate, pH, DO, conductivity, or of 750 ohms each	
Filmes       Parshal Panner Bowlus, Leopoid-Lago, Trapezoidal, Manning Formula       Serial Output       Current status and readings, in response to command or automatically stybicable time intervals. ASCII comma separated values at 1200, 2400, 4800, or 9600 bps         Data Pointis       Four sets of Dievel-flow rate points       Operating Temperature       0* to 140° F       -18° to 60° C         Data Pointis       Four sets of Dievel-flow rate points       Operating Temperature       0* to 140° F       -18° to 60° C         Totalizers       Storage Temperature       0* to 140° F       -18° to 60° C         LCD       9-digit, floating decinal point, resettable       Length       4.0 in       10.2 cm         Machanical (optional)       7-digit, non-resettable       Diameter       3.6 in       9.1 cm         Rain Gauge Input       Contact closure, normaly open       Cable Length       2.2 lbs       1.0 kg         Parameter Inputs       pH. dissolved oxgen; conductivity, and temperature (with optional YS 1600 Multi-Parameter Water Cuality Monitor); pH and temperature Water Cuality Monitor); 	Weirs	V-notch, rectangular with and w Cipolletti	vithout end contractions,	Relay Outputs	2 form C relays with field select flow rate (with optional High/Lo	table trip points based on w Alarm Relays)	
Manning Formula       Round, U-channel, rectangular, trapezoidal       Separating Temperature       Separating Temperature       Operating Temperature       Of to 100°F       -181° to 60°C         Data Points       Four sets of 50 level-flow rate points       Storage Temperature       -40° to 140°F       -40° to 60°C         Totalizers       Ultrasonitic Sensor       Ultrasonitic Sensor       -40° to 140°F       -40° to 60°C         LCD       9-digli, floating decimal point, resettable       Diameter       3.6 in       9.1 cm         Rain Gauge Input       Contact closure, normally open       Cable Length       2.5 ft.       7.6 m         Resolution       0.01 or 0.004 in.       0.25 or 0.1 mm       Cable Diameter       0.3 in       0.8 cm         Parameter Inputs       pH dissolved oxygen, conductivity, and temperature (with optional Isco 201 Parameter Motor (with optional Isco 201 Parameter Motor (with optional Isco 201 Parameter Motor (with optional Isco 201 Parameter Maximum       1 ft       0.3 m         Sampler Pacing Output       12V pulse       Sampler Input       Fevent mark, bottle number       Maximum       1 ft       0.3 in 0.3 m         Speed       Off. 0.5, 1.2, 4 inftr       [Off. 0.5, 1.0 m/r         Resourding Span       Ustoreardise wit	Flumes	Parshall, Palmer-Bowlus, Leop H, HS, HL	old-Lagco,Trapezoidal,	Serial Output	Current status and readings, in response to command or automatically at selectable time intervals, ASCII comma		
Data Points         Four sets dio level-flow rate points         Operating temperature         Other 10 MOThener         -148 Hod VC           Equation         Two-term polynomial         Storage Temperature         -40° to 60°C         -40° to 60°C           Totalizers         -40° to 60°C         -40° to 60°C         -40° to 60°C           Resolution         7digit, non-resetable         Length         40° to 140°F         -40° to 60°C           Resolution         0.01 or 0.004 in.         [0.25 or 0.1 mm         Cable Length         25 ft         7.5 m           Parameter Inputs         pH dissolved oxygen, conductivity, and temperature (with optional VSI 600 Multi-Parameter Water Cuality Monio); pH and temperature (with optional VSI 600 Multi-Parameter Water Cuality Monio); pH and temperature (with optional Sco 201 Parameter Module)         22 lbs         1.0 kg           Sampler Pacing Output         12V pulse         Maximum         11 ft         0.3 m           Sampler Pacing Output         12V pulse         Maximum         11 ft         0.3 m           Sepeed         Off, 0.5, 1, 2, 4 in/m         Off, 12, 5, 25, 5, 10 cm/m         Maximum         11 ft         0.31 m or less ±0.005 m           Resolution         1/240 of recording span         Off, 12, 5, 25, 5, 10 cm/m         Maximum         11 ft         0.31 m or less ±0.005 m           Ninnerval Report Comte	Manning Formula	Round, U-channel, rectangular	, trapezoidal		separated values at 1200, 240	0, 4800, or 9600 bps	
Equation       Two-term polynomial       Storage temperature       I-d' to 140°F       I-d' to 40°F         Totalizers       Ultrasconic Sensor       Ultrasconic Sensor         LCD       9-digit, floating decimal point, resettable       Diameter       3.6 in       9.1 cm         Rain Gauge Input       Contact closure, normally open       Cable Length       2.5 fin       7.6 m         Resolution       0.01 or 0.004 in       [0.25 or 0.1 mm       Cable Diameter       0.3 in       0.8 cm         Parameter Inputs       PH, dissolved oxygen, conductivity, and temperature (with optional Sto 201 Parameter Water Quality Monitor): pH and temperature (with optional Sto 201 Parametare Mater Quality Monitor): pH and temperature (with optional Sto 201 Parametare Mater Quality Monitor): pH and temperature (with optional Sto 201 Parametare)       NEMA 4X, 6P       IP66         Sampler Activation Conditions       Enclosure (self-certificit)       NEMA 4X, 6P       IP66         Sampler Activation Conditions       Enclosure (self-certificit)       NEMA 4X, 6P       IP66         Frequency       40 kHz       Range	Data Points	Four sets of 50 level-flow rate p	points	Operating Temperature		-18° to 60°C	
Utrasonic Sensor         LCD       9-digit, floating decimal point, resettable       Length       4.0 in       102 cm         Machanical (optional)       7-digit, non-resettable       Diameter       3.6 in       9.1 cm         Rain Gauge Input       Contact closure, normally open       Cable Length       25 ft       7.6 m         Resolution       0.01 or 0.004 in       0.2 cm or 0.004 in       0.8 cm       9.8 cm         Parameter Inputs       PH, dissolved oxygen, conductivity, and temperature (with optional VSI 600 Multi-Parameter Water Ouality Monitor): pH and temperature (with optional usco 201 Parameter Module)       NEMA 4X, 6P       1P.88         Sampler Activation Conditions       Enabled, AND and OR combinations of any two of level, flow rate, raintal, PH, DO, conductivity, and temperature       Weight (including cable)       2.2 lbs       1.0 kg         Sampler Pacing Output       12V pulse       Range       Namum       1ft       0.3 m         Sampler Nations       Event mark, bottle number       Sa m       0 to 10 ft       0 to 3 m         Printer       Up to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature stime: includes totalized flow, Rainfal and sampler events (time and bottle number) are also recorded sampler, history       Head       Maximum         Net wide x58 ft (114 cm x 17.7 m); z5, 5, 5, 10 cm/hr       Error       Change*       Error	Equation	Two-term polynomial		Storage Temperature	-40° to 140°F	-40° to 60°C	
LCD     9-digit, floating decimal point, resettable     Length     4.0 in     10.2 cm       Mechanical (optional)     7-digit, non-resettable     Diameter     3.6 in     9.1 cm       Rain Gauge Input     Contact closure, normally open     Cable Length     25 ft     7.6 m       Resolution     0.01 or 0.004 in.     0.25 or 0.1 mm     Cable Diameter     0.3 in     0.8 cm       Parameter Inputs     pH, dissolved oxygen, conductivity, and temperature (with optional Isco 201 Parameter Module)     Tectosure (self-certified)     NEMA 4X, 6P     IP68       Sampler Activation Conditions     Enabled, disabled, AND and OR combinations of any two of level, flow rate, rainfail, PH, DO, conductivity, and temperature vitime, includes totalized flow. Rainfail and sampler events (time and bottle number)     11 ft     0.3 m       Printer     Up to 3 graphs of level, flow.rate, pH, DO, conductivity, and temperature vs time, includes totalized flow. Rainfail and sampler events (time and bottle number) are also recorded to 10 of 1.0 5.1, 2.4 inhr     Of 1.1 5.2, 5.5, 5.1 0 cm/hr       Recording Modes     Up to 3 graphs of level, flow.rate, pH, DO, conductivity, and temperature vs time, includes totalized flow. Rainfail and sampler revents (time and bottle number) are also recorded to 10 of 1.0 10.1 the 0.3 to 3.3 m       Reports Printed     Flow meter program, 2 independent time interval reports, flow meter history sampler history     Temperature Coefficient maximum, and average flow rate, level, PL, OD, conductivity, and temperature change)       Reports Printed <td>Totalizers</td> <td></td> <td></td> <td>Ultrasonic Sensor</td> <td></td> <td></td>	Totalizers			Ultrasonic Sensor			
Mechanical (oplional)       7-dig(t, non-resettable)       Diameter       3.6 in       9.1 cm         Rain Gauge Input       Contact closure, normally open       Cable Length       25 ft       7.6 m         Resolution       0.01 or 0.004 in.       0.25 or 0.1 mm       Cable Diameter       0.3 in       0.8 cm         Parameter Inputs       pH, dissolved oxyger, conductivity, and temperature (with optional VS 1600 Multi-Parameter Valer Quality Monitor).       Velocities (Sectorified)       NEMA 4X, 6P       IP68         Parameter Inputs       Enabled, disabled, AND and OR combinations of any two of teme, twister, anitalit, pH, DO, conductivity, and temperature       Range (distance from sensor to liquid)       NEMA 4X, 6P       IP68         Sampler Pacing Output       12V pulse       Range (distance from sensor to liquid)       Minimum       1ft       0.3 m         Sampler Pacing Output       12V pulse       Maimum       1ft       0.3 m       Maximum         Sampler vents (lime and bottle number       Span       0 to 10 ft       0 to 3 m       Maximum         Printer       Recording Modes       Up to 3 graphs o level, flow rate, pH, DO, conductivity, and temperature vs time: includes totalized flow. Rairfall and tor0 70%	LCD	9-digit, floating decimal point, re	esettable	Length	4.0 in	10.2 cm	
Rain Gauge Input       Contract closure, normally open       Cable Length       25 ft       7.6 m         Resolution       0.01 or 0.004 in.       0.25 or 0.1mm       Cable Logineter       0.3 in       0.8 cm         Parameter Inputs       pH, dissolved oxygen, conductivity, and temperature (with optional VSI 600 Multi-Parameter Water Quality Monitor); pH and temperature (with optional Sc 021 Parameter Module)       Velogit (including cable)       2.2 lbs       1.0 kg         Sampler Activation Conditions       Enabled, disabled, AND and OR combinations of any two of level, flow rate, rainfall, pH, DO, conductivity, and temperature       Velogit (including cable)       1 ft       0.3 m         Sampler Pacing Output       12V pulse       To ft mark, bottle number       Span       0 to 10 ft       0 to 3 m         Printer       Up to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature vs time: includes totalized flow. Rainfall and sampler events (time and bottle number) are also recorded       Span       0 to 10 ft       0 to 3 m         Recording Modes       Of, 0.5, 1, 2, 4 in/hr       Of, 5, 1, 2, 4 in/hr       Of, 12, 5, 2, 5, 10 cm/hr       Rainfing Distance       1 to 11 ft       0.31 to 3 am       0.0009 m         Reports Printed       Flow meter program, 2 independent time interval reports, flow meter history and sampler history       Temperature Coefficient       Maximum       Charge Maximum       Charge Maximum       Charge Maximum <td>Mechanical (optional)</td> <td>7-digit, non-resettable</td> <td></td> <td>Diameter</td> <td>3.6 in</td> <td>9.1 cm</td>	Mechanical (optional)	7-digit, non-resettable		Diameter	3.6 in	9.1 cm	
Resolution       0.01 or 0.004 in.       [0.25 or 0.1 mm       Cable Diameter       0.3 in       0.8 cm         Parameter Inputs       pH, dissolved oxygen, conductivity, and temperature (with optional Isco 201 Parameter Mater Quality Monitor); pH and temperature (with optional Isco 201 Parameter Module)       NEMA 4X, 6P       1P68         Sampler Activation Conditions       Enabled, disabled, AND and OR combinations of any two of level, flow rate, rainfall, pH, DO, conductivity, and temperature       Ange, (dance from sensor to liquid)       NEMA 4X, 6P       IP68         Sampler Pacing Output       12V pulse       Ange, (dance from sensor to liquid)       Minimum       1ft       0.3 m         Printer       Event mark, bottle number       Spend       0 to 10 ft       0 to 3 m         Printer       Up to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature vs time; includes totalized flow. Rainfall and samplet events (lime and bottle number) are also recorded       Namum       11 ft       0.3 to 3.3 m         Printer       User selectable with multiple over-ranges       Head       Maximum       Change*       Error         Recording Span       User selectable with multiple over-ranges       1 to 11 ft       ±0.03 ft       0.31 to or less ±0.006 m         Network fixed waves gef flow rate, evel, pH, DO, conductivity, and temperature and time of recording span       Temperature Coefficient       Maximum error over compen- ated temperature range (	Rain Gauge Input	Contact closure, normally open	1	Cable Length	25 ft	7.6 m	
Parameter Inputs     pH, dissolved oxygen, conductivity, and temperature (with optional YSI do0 Multi-Parameter Water Quality Monitor): pH and temperature (with optional isso 201 Parameter Module)     Weight (including cable)     2.2 lbs     1.0 kg       Sampler Activation Conditions     Enabled, disabled, AND and OR combinations of any two of level, flow rate, rainfall, pH, DO, conductivity, and temperature     Meinturn     NEMA 4X, 6P     IP68       Sampler Pacing Output     12V pulse     Minimum     1ft     0.3 m       Sampler Input     Event mark, bottle number     Span     010 10 ft     0 to 3 m       Printer     Up to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature vs time; includes totalized flow. Rainfall and sampler events (time and bottle number) are also recorded     Span     010 10 ft     0 to 3 m       Speed     Off, 0.5, 1, 2, 4 in/hr     Off, 1.25, 2.5, 5, 10 cm/hr     Off, 1.25, 2.5, 5, 10 cm/hr     Natinum     Head     Maximum       Recording Span     User selectable with multiple over-ranges     Into triat ±0.03 ft     0.31 to 3.3 m     ±0.000 ft       Reports Printed     Flow meter history, sampler history     Temperature Coefficient Maximum error over compen- sated temperature range (per erature, and time of occurrence; interval flow; total rainfall; number of samples (ft).4 cm x 17.7 m) plain white paper, replaceable roll     500.00047 x D per *F     -30° to 60°C       Paper     40 is nike (PVC) jackel     Sensor Housing     Glass-filiorced epoxy	Resolution	0.01 or 0.004 in.	0.25 or 0.1 mm	Cable Diameter	0.3 in	0.8 cm	
Sampler Activation Conditions     Enabled, disabled, AND and OR combinations of any two of level, flow rate, rainfail, pH, DO, conductivity, and temperature Module)     Enabled, disabled, AND and OR combinations of any two of level, flow rate, rainfail, pH, DO, conductivity, and temperature     Enclosure (self-certified)     NEMA 4X, 6P     IP68       Sampler Activation Conditions     Enabled, disabled, AND and OR combinations of any two of level, flow rate, rainfail, pH, DO, conductivity, and temperature     40 kHz     40 kHz       Sampler Pacing Output     12V pulse     11 ft     0.3 m       Sampler Name     Up to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature vs time; includes totalized flow. Rainfail and sampler events (time and bottle number) are also recorded     Span     0 to 10 ft     0 to 3 m       Speed     Off. 0.5, 1, 2, 4 in/hr     Off, 1.25, 2.5, 5, 10 cm/hr     Maximum     Head     Maximum       Reports Printed     Flow meter program, 2 independent time interval reports, flow meter history, sampler history     Off, 1.25, 2.5, 5, 10 cm/hr     Temperature Coefficient Maximum error over compen- sated temperature range (per degree of	Parameter Inputs	pH, dissolved oxygen, conductivity, and temperature (with optional YSI 600 Multi-Parameter Water Quality Monitor); pH and temperature (with optional Isco 201 Parameter Module)		Weight (including cable)	2.2 lbs	1.0 kg	
Prequency       40 kHz         Sampler Activation Conditions       Enabled, disabled, AND and OR combinations of any two of level, flow rate, rainfall, pH, DO, conductivity, and temperature       Range (distance from sensor to liquid)       1ft       0.3 m         Sampler Pacing Output       12V pulse       Maximum       1ft       0.3 m         Sampler Input       Event mark, bottle number       Span       0 to 10 ft       0 to 3 m         Printer       Up to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature vs time; includes totalized flow. Rainfall and sampler events (time and bottle number) are also recorded asampler sents (time and bottle number) are also recorded flow restriction of the conting span       10 to 10 ft       0 to 3 m         Recording Span       User selectable with multiple over-ranges       10 to 11 ft       0.31 to 3.3 m       40 to 70% relative humidity         Reports Printed       Flow meter program, 2 independent time interval reports, flow meter history, sampler history       Temperature Coefficient Maximum error over compen- sated temperature range (pr edegree of temperature change)       40 uo? F       -30° to 60° C         Operating Temperature       -22° to 140° F       -30° to 60° C         Change of the liquid built (1.4 cm x 17.7 m), 12 pitch       Acoustic Window       Acoustic Window       Glass-filled polyester         Paper       4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, repaceable roll       58 nor Housin				Enclosure (self-certified)	NEMA 4X, 6P	IP68	
Range       Range <th an="" an<="" td=""><td></td><td>Frequency</td><td>40 kHz</td><td></td></th>	<td></td> <td>Frequency</td> <td>40 kHz</td> <td></td>				Frequency	40 kHz	
Sampler Activation Conductions       Elabelet, fusibility, and temperature level, flow rate, rainfall, pH, DO, conductivity, and temperature       (distance from sensor to liquid)       1ft       0.3 m         Sampler Pacing Output       12V pulse       11 ft       0.3 m       11 ft       0.3 m         Sampler Input       Event mark, bottle number       Span       0 to 10 ft       0 to 3 m       0 to 3 m         Printer       Up to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature vs time; includes totalized flow. Rainfall and sampler events (time and bottle number) are also recorded       Span       0 to 10 ft       0 to 3 m         Speed       Off, 0.5, 1, 2, 4 in/hr       Off, 12.5, 2.5, 5, 10 cm/hr       Evel Measurement Accuracy Al 22°C (72°F), still air, and 40 to 70% relative humidity       Head       Maximum       Maximum         Recording Span       User selectable with multiple over-ranges       Temperature Coefficient       Head       0.31 to 3.3 m       ±0.000 m         Reports Printed       Flow meter program, 2 independent time interval reports, flow meter history, sampler history       Temperature Coefficient       ±0.000047 x D per °F       ±0.000045 x D per °C         Maximum error over compen- sated temperature range (pri degree of temperature range (pri degree of temperature range)       ±0.10 °F       -30° to 60°C         Operating Temperature       -22° to 140°F       -30° to 60°C       -	Samplar Activation Conditions	Enabled disabled AND and OF	combinations of any two of	Range			
Sampler Pacing Output       12V pulse       1ft       0.3 m         Sampler Input       Event mark, bottle number       Minimum       11 ft       0.3 m         Printer       Recording Modes       Up to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature vs time; includes totalized flow. Rainfall and sampler events (time and bottle number) are also recorded sampler events (time and bottle number) are also recorded to 10 ft       0 to 10 ft       0 to 3 m         Speed       Off, 0.5, 1, 2, 4 in/hr       Off, 1.25, 2.5, 5, 10 cm/hr       Blanking Distance       1 to 11 ft       0.31 to 3.3 m         Recording Span       User selectable with multiple over-ranges       Minimum       10 to 70% relative humidity       Head       Maximum         Reports Printed       Flow meter program, 2 independent time interval reports, flow meter history, sampler history       Temperature Coefficient maximum, and average flow rate, level, pH, DO, conductivity, and temperature change       ±0.000047 x D per *F       ±0.000085 x D per *C         Interval Report Contents       Site number; time interval; total flow; minimum, maximum, and average flow rate, level, pH, DO, conductivity, and temperature change       -30° to 60°C       -30° to 60°C         Character Size       0.09 in high x 0.07 in wide (2.4 mm x 1.7 mn), 12 pitch       Acoustic Window       Glass-reinforced epoxy       -30° to 60°C         Ribbon       19.7 ft (6.0 m) black nylon, replaceable       10 in noreles exel </td <td></td> <td>level flow rate rainfall pH DO (</td> <td>conductivity and temperature</td> <td>(distance from sensor to liquid)</td> <td></td> <td></td>		level flow rate rainfall pH DO (	conductivity and temperature	(distance from sensor to liquid)			
Sampler roung ouger       11 ft       3.3 m         Sampler Input       Event mark, bottle number       Maximum       11 ft       0 to 10 ft       0 to 3 m         Printer       Wp to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature vs time; includes totalized flow. Rainfall and sampler events (time and bottle number) are also recorded       Span       0 to 10 ft       0 to 3 m         Speed       Off, 0.5, 1, 2, 4 in/hr       Off, 1.25, 2.5, 5, 10 cm/hr       Head       Maximum       Head       Maximum         Recording Span       User selectable with multiple over-ranges       0 to 70% relative humidity       10 to 11 ft       0.31 to 3.3 m       ±0.006 m         Resolution       1/240 of recording span       User selectable with multiple over-ranges       #condition       0.31 to 3.3 m       ±0.009 m         Interval Report Contents       Site number; time interval; total flow; minimum, and average flow rate, level, pH, DO, conductivity, and temperature and average flow rate, level, pH, DO, conductivity, and temperature of sampler, flow meter history and average flow rate, level, pH, DO, conductivity, and temperature frage (per eferting temperature change)       22° to 140° F       -30° to 60° C         Character Size       0.09 in high x 0.07 in wide (2.4 mm x 1.7 m) plain white paper, replaceable roll       12 plich       Acoustic Window       Glass-reinforced epoxy         Ribbon       19.7 ft (6.0 m) black nylon, replaceable       19	Sampler Pacing Output	12V nulse	sonddollwig, and tomporataro	Minimum	1 ft	0.3 m	
Span       0 to 10 ft       0 to 3 m         Printer       Up to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature vs time; includes totalized flow. Rainfall and sampler events (time and bottle number) are also recorded       Span       0 to 10 ft       0 to 3 m         Speed       Off, 0.5, 1, 2, 4 in/hr       Off, 1.25, 2.5, 5, 10 cm/hr       Level Measurement Accuracy At 22°C (72°F), still air, and 40 to 70% relative humidity       Head to 70% relative humidity       Maximum Change*       Head to 0.31 to 3.3 m       Maximum Change*       Head to 10 ft       0.03 to 3.3 m         Recording Span       User selectable with multiple over-ranges       Temperature Coefficient       Head to 70% relative humidity       Maximum Change*       Head to 31 to 3.3 m       ±0.006 m         Not to 70% relative humidity       11/24 of recording span       Temperature Coefficient       ±0.00047 x D per °F       ±0.000085 x D per °C         Resolution       1/240 of recording span and average flow rate, level, pH, DO, conductivity, and temperature range (per erature, and time of occurrence; interval flow; total rainfall; number of samples, flow meter history and sampler history       Temperature change)       ±0.000047 x D per °F       ±0.000085 x D per °C         Operating Temperature       0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitch       Paper       -30° to 60°C       -22° to 140°F       -30° to 60°C         Rebord       0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitch<	Sampler Innut	Event mark bottle number		Maximum	11 ft	3.3 m	
Blanking Distance       1 to 11 ft       0.3 to 3.3 m         Recording Modes       Up to 3 graphs of level, flow rate, pH, DO, conductivity, and temperature vs time; includes totalized flow. Rainfall and sampler events (time and bottle number) are also recorded       Interval Recording Span       Interval Report Sprinted       Off, 0.5, 1, 2, 4 in/hr       Off, 1.25, 2.5, 5, 10 cm/hr         Resolution       1/240 of recording span       User selectable with multiple over-ranges       0.31 to 3.3 m       ±0.000 m         Reports Printed       Flow meter program, 2 independent time interval reports, flow meter history, sampler history       Temperature Coefficient Maximum error over compensated temperature range (per eature, and time of occurrence; interval flow; total rainfall; number of samples, flow meter history and sampler history       Temperature       -22° to 140°F       -30° to 60°C         Operating Temperature       -22° to 140°F       -30° to 60°C       -         Character Size       0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitch       Materials       -         Paper       4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable roll       Sensor Housing       Glass-reinforced epoxy       -         Ribbon       19.7 ft (6.0 m) black nylon, replaceable       Cable       Polyvinyl chloride (PVC) jacket       -	Printer	Event mark, bottle namber		Span	0 to 10 ft	0 to 3 m	
Recording modelsOp to 5 graphs of the content of the con	Recording Modes	Lin to 3 graphs of level, flow rat	te nH DO conductivity and	Blanking Distance	1 to 11 ft	0.3 to 3.3 m	
SpeedOff, 0.5, 1, 2, 4 in/hrOff, 1.25, 2.5, 5, 10 cm/hrIn the Portendation number of samples, flow meter program, 2 independent time interval reports, flow meter historyTemperature Coefficient Maximum error over compensated temperature range (per degree of temperature change)1.0 to 11 ft ± 0.03 ft0.31 to 3.3 m ± 0.000 mInterval Report ContentsSite number; time interval; total flow; total rainfall; number of samples, flow meter history and sampler historyTemperature change)-22° to 140°F-30° to 60°COperating Temperature-22° to 140°F-30° to 60°C-30° to 60°C-30° to 60°CCharacter Size0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitchAcoustic WindowGlass-reinforced epoxyPaper4.5 in wide x 58 ft (11.4 cm x		temperature vs time; includes to sampler events (time and bottle	otalized flow. Rainfall and e number) are also recorded	Level Measurement Accuracy At 22°C (72°F), still air, and 40 to 70% relative humidity	Head Maximum Change* Error	Head Maximum Change* Error	
Recording SpanUser selectable with multiple over-rangesResolution1/240 of recording span1/240 of recording spanReports PrintedFlow meter program, 2 independent time interval reports, flow meter history, sampler historyTemperature Coefficient Maximum error over compen- sated temperature range (per degree of temperature change)1.0 to 11 ft±0.03 ft0.31 to 3.3 m±0.009 mInterval Report ContentsSite number; time interval; total flow; minimum, and average flow rate, level, pH, DO, conductivity, and temp- erature, and time of occurrence; interval flow; total rainfall; number of samples, flow meter history and sampler historyTemperature change)1.0 to 11 ft±0.00047 x D per °F±0.000085 x D per °COperating Temperature22° to 140°F-30° to 60°C-30° to 60°C-30° to 60°CCharacter Size0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitchMaterials-22° to 140°F-30° to 60°CPaper4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable rollSensor HousingGlass-reinforced epoxyRibbon19.7 ft (6.0 m) black nylon, replaceableCablePolywinyl chloride (PVC) jacket	Speed	Ott, 0.5, 1, 2, 4 in/hr	Ott, 1.25, 2.5, 5, 10 cm/hr	-	1.0 ft or less ±0.02 ft	0.31 m or less ±0.006 m	
Resolution       1/240 of recording span         Reports Printed       Flow meter program, 2 independent time interval reports, flow meter program, 2 independent time interval reports, flow meter program, 2 independent time interval reports, flow meter program, 2 independent time interval meter history       Temperature Coefficient Maximum error over compensated temperature range (per degree of temperature change)       ±0.000047 x D per °F       ±0.000085 x D per °C         Interval Report Contents       Site number; time interval; total flow; minimum, and average flow rate, level, pH, DO, conductivity, and temperature, and time of occurrence; interval flow; total rainfall; number of samples, flow meter history and sampler history       Deprating Temperature       -22° to 140°F       -30° to 60°C         Character Size       0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitch       Materials       Acoustic Window       Glass-reinforced epoxy         Paper       4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable roll       Temperature       Cable       Polywinyl chloride (PVC) jacket	Recording Span	User selectable with multiple ov	ver-ranges		1.0 to 11 ft ±0.03 ft	0.31 to 3.3 m ±0.009 m	
Reports Printed       Flow meter program, 2 independent time interval reports, flow meter pistory       Number pistory       Maximum error over compen- sated temperature range (per degree of temperature change)       Where D is the distance from the transducer to the liquid surface.         Interval Report Contents       Site number; time interval; total flow; minimum, and average flow rate, level, pH, DO, conductivity, and temp- erature, and time of occurrence; interval flow; total rainfall; number of samples, flow meter history and sampler history       Operating Temperature       -22° to 140° F       -30° to 60° C         Character Size       0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitch       Materials       Caustic Window       Glass-reinforced epoxy         Paper       4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable roll       Sensor Housing       Glass-filled polyester         Ribbon       19.7 ft (6.0 m) black nylon, replaceable       Cable       Polywinyl chloride (PVC) jacket	Resolution	1/240 of recording span		Temperature Coefficient	+0.000047 x D per °F	+0.000085 x D per °C	
Interval Report Contents       Site number; time interval; total flow; minimum, maximum, and average flow rate, level, pH, DO, conductivity, and temperature, and time of occurrence; interval flow; total rainfall; number of samples, flow meter history and sampler history       sated temperature range (per degree of temperature change)       to the liquid surface.         Character Size       0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitch       Paper       4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable roll       5 ensor Housing       Glass-reinforced epoxy         Ribbon       19.7 ft (6.0 m) black nylon, replaceable       Cable       Polywinyl chloride (PVC) jacket	Reports Printed	Flow meter program, 2 indeper	ndent time interval	Maximum error over compen-	Where D is the distance from t	he transducer	
Interval Report Contents       Site number; time interval rotal now; minimum, maximum, and average flow rate, level, pH, DO, conductivity, and temperature, and time of occurrence; interval flow; total rainfall; number of samples, flow meter history and sampler history       degree of temperature       -22° to 140°F       -30° to 60°C         Character Size       0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitch       Materials       -30° to 60°C       -30° to 60°C         Paper       4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable roll       4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable roll       Sensor Housing       Glass-reinforced epoxy         Ribbon       19.7 ft (6.0 m) black nylon, replaceable       Cable       Polywinyl chloride (PVC) jacket	Internal Demark Contents	Feporis, now meter history, sam	Agent mistory	sated temperature range (per	to the liquid surface.		
Paper       And average new rate, lever, pri, bo, condition, and temp- erature, and time of occurrence; interval flow; total rainfall; number of samples, flow meter history and sampler history       Operating Temperature       -22° to 140°F       -30° to 60°C         Character Size       0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitch       Materials       -30° to 60°C       -30° to 60°C         Paper       4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable roll       6 class-reinforced epoxy       -30° to 60°C         Ribbon       19.7 ft (6.0 m) black nylon, replaceable       Cable       Polyvinyl chloride (PVC) jacket	Interval Report Contents	Sile number; time interval; total	10W; MINIMUM, MAXIMUM,	degree of temperature change)			
Character Size     0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitch     Compensated Temperature     -22° to 140°F     -30° to 60°C       Paper     4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable roll     Acoustic Window     Glass-reinforced epoxy     -30° to 60°C       Ribbon     19.7 ft (6.0 m) black nylon, replaceable     Cable     Polyvinyl chloride (PVC) jacket		erature, and time of occurrence	: interval flow: total rainfall:	Operating Temperature	-22° to 140°F	-30° to 60°C	
Character Size     0.09 in high x 0.07 in wide (2.4 mm x 1.7 mm), 12 pitch     Materials       Paper     4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable roll     Acoustic Window     Glass-reinforced epoxy       Ribbon     19.7 ft (6.0 m) black nylon, replaceable     Cable     Polyvinyl chloride (PVC) jacket		number of samples, flow meter	history and sampler history	Compensated Temperature	-22° to 140°F	-30° to 60°C	
Paper     4.5 in wide x 58 ft (11.4 cm x 17.7 m) plain white paper, replaceable roll     Acoustic Window     Glass-reinforced epoxy       Ribbon     19.7 ft (6.0 m) black nylon, replaceable     Cable     Polyvinyl chloride (PVC) jacket	Character Size	0.09 in high x 0.07 in wide (2.4	mm x 1.7 mm), 12 pitch	Materials			
replaceable roll         Sensor Housing         Glass-filled polyester           Ribbon         19.7 ft (6.0 m) black nylon, replaceable         Cable         Polyvinyl chloride (PVC) jacket	Paper	4.5 in wide x 58 ft (11.4 cm x 1	7.7 m) plain white paper,	Acoustic Window	Glass-reinforced epoxy		
Ribbon         19.7 ft (6.0 m) black nylon, replaceable         Cable         Polyvinyl chloride (PVC) jacket		replaceable roll	21 · F · F · F · 7	Sensor Housing	Glass-filled polyester		
	Ribbon	19.7 ft (6.0 m) black nylon, repl	laceable	Cable	Polyvinyl chloride (PVC) jacket	Polyvinyl chloride (PVC) jacket	

\* Actual change in vertical distance between the ultrasonic sensor and the liquid surface

## 4220 Submerged Probe Flow Meter

The probe on the Isco 4220 uses a differential pressure transducer to measure the depth of the liquid. The probe's venting system automatically compensates for changes in atmospheric pressure to maintain accuracy.

## Accurate Under Tough Conditions

The 4220 provides accurate measurement at sites where wind, steam, foam, turbulence, or air temperature fluctuations exist. The probe can accurately sense pressure even when covered with silt and sand.

## **Fast and Easy Installation**

Isco mounting rings make it easy to install the probe in round pipes, manhole inverts, and other open channels. And with the Isco Street Level Installation Tool, you can install your monitoring system from ground level, eliminating the costs and hazards of entering manholes.

In addition, most flumes are available with an integral recess for mounting an Isco Submerged Probe.



The 4220 Submerged Probe accurately measures depth, even when covered with silt and sand.

## Isco 4220 Specifications

wireless module

Isco 581 Rapid Transfer Device (RTD)

Data Retrieval (optional)

Flow Meter							
Size (H x W x D) (without power source)	15.5 in x 11.5 in x 10.5 in	39.4 cm x 29.2 cm x 26.7 cm	Voice Messaging (with optional internal	Calls up to 5 telephone numbers with programmable delay between calls, activated based on AND and OR combination of any two of level flow rate, rainfall pH_DO, conductivity.			
Weight (without power source)	17.3 lbs	7.81 kg	telephone modem)	or any two or lever, now rate, rainiali, pH, DO, condu		onductivity,	
Material	High-impact molded polystyrene structural foam		Analog Outputs (optional)	Lin to 2 isolated internal outputs 0 to 20 mA or 4		to 20 mA	
Enclosure (self-certified)	NEMA 4X IP65			scaleable based on level, flow rate, pH, DO, conductivity, or temperature, into a maximum of 750 ohms each			
Power	1 in/hr (2.5 cm/hr) and continuous level reading interval)		Dolov Outpute				
Typical Battery Life	(printer set at 1 in/hr (2.5 cm/hr) and continuous level reading interval)			on flow rate (w	on flow rate (with optional High/Low Alarm Relays)		45eu /s)
934 Nickel-Cadmium Battery	8 to 11 days		Serial Output	or automatica	Current status and readings, in response to command or automatically at selectable time intervals, ASCII comma		Imand CII comma
940 Lead-Acid Dallery	75 to 00 days			separated val	ues at 1200, 24	00, 4800, or 9600	bps
Program Memory	Non volatile, programmable fla	sh: can be undated via	Operating Temperature	0° to 140°F		-18° to 60°C	
Trogrammemory	interrogator port without openin	ng the enclosure.	Storage Temperature	-40° to 140°F		-40° to 60°C	
Display	Backlit LCD, 2-line, 80-characte	r	Submerged Probe	1			
Level-to-Flow Rate			Length	9.5 in		24.1 cm	
Conversions			Diameter	0.875 in		2.2 cm	
Weirs	V-notch, rectangular with and	without end contractions,	Frontal Area	0.765 in <sup>2</sup>		4.93 cm <sup>2</sup>	
	Cipolletti		Cable Length	25 ft		7.6 m	
Flumes	Parshall, Palmer-Bowlus, Leop	oold-Lagco, Frapezoidal,	Cable Diameter	0.3 in		0.8 cm	
Manning formula	Pound II channel rectangula	r tranozoidal	Weight (including cable)	3 lbs		1.4 kg	
Data Doints	Four sets of 50 level flow rate	noints	Level Measurement Method	Submerged pr	essure transdu	cer mounted in the	flow stream
Equation	Two term polynomial	points	<ul> <li>Transducer Type</li> </ul>	Differential line	ear integrated c	ircuit pressure tran	sducer
Totalizars			<ul> <li>Level Measurement Range</li> </ul>	0.1 to 10 ft		0.03 to 3.05 m	
	O digit floating desimal point r		Maximum Allowable Depth	20 ft		6.1 m	
	9-digit, noating decimal point, i	esellable	Level Measurement Accuracy	Level*	Error	Level*	Error
	7-digit, non-resettable (optional		Non-linearity, repeatability, and	0.033 to 5.0 ft	±0.008 ft/ft	0.01 to 1.52 m	±0.008 m/m
Rain Gauge Input	Contact closure, normally oper	0.25 or 0.1 mm	hysteresis at 25°C (77°F) (does not include temperature coefficient)	>5.0 ft	±0.012 ft/ft	>1.52 m	±0.012 m/m)
Parameter Innuts	nH dissolved oxygen conduct	ivity and temperature (with	Tanananah wa Caaffiaiant	L es se l*	Ганан	L es se l *	Блиси
	optional YSI 600 Multi-Parame	ter Water Quality Monitor);	Maximum error over compen-	Level	EITOF	Level	Error
pH and temperature (with op Module)		onal Isco 201 Parameter	sated temperature range (per degree of temperature change)	0.1 to 4.0 ft 4.0 to 10 ft	±0.005 ft/°F ±0.007 ft/°F	0.03 to 1.22 m 1.22 to 3.05 m	±0.0027m/°C ±0.0038m/°C
Sampler Activation Conditions	Enabled, disabled, AND and O	R combinations of any two of	Operating Temperature	32° to 160°F 0° to 71°C			
	level, flow rate, rainfall, pH, DO,	conductivity, and temperature	Compensated Temperature	32° to 122°F		0° to 50°C	
Sampler Pacing Output	12V pulse		Materials				
Sampler Input	Event mark, bottle number		Submerged probe	Type 316 stain	less steel, chlor	inated polyvinyl chlo	oride (CPVC)
Printer			Cable	Polyvinyl chlor	ide (PVC)		
Recording Modes	Up to 3 graphs of level, flow ra temperature vs time; includes t sampler events (time and bottl	te, pH, DO, conductivity, and totalized flow. Rainfall and e number) are also recorded	* Actual vertical distance betw	veen the submer	rged probe and	the liquid surface	ò
Speed	Off, 0.5, 1, 2, 4 in/hr	, Off, 1.25, 2.5, 5, 10 cm/hr	-				
Recording Span	User selectable with multiple o	ver-ranges	-				
Resolution	1/240 of recording span	5	-				
Reports Printed	Flow meter program, 2 independent flow meter history, sampler history	ndent time interval reports, torv					
Interval Report Contents	Site number; time interval; total and average flow rate, level, pl erature, and time of occurrence number of samples, flow meter	flow; minimum, maximum, 4, DO, conductivity, and temp- e; interval flow; total rainfall; history and sampler history					
Character Size	0.09 in high x 0.07 in wide (2.4	mm x 1.7 mm), 12 pitch					
Paper	4.5 in wide x 58 ft (11.4 cm x 1 replaceable roll	7.7 m) plain white paper,	1				
Ribbon	19.7 ft (6.0 m) black nylon, rep	laceable	1				
Data Storage Memory			-				
Capacity	80,000 bytes (approximately 40 a maximum of 12 memory part of level, rainfall, pH, DO, condu readings at 15 minute intervals,	),000 readings) divided into itions; equal to 100 days uctivity, and temperature plus 3,000 sample events.					
Setup and Data Retrieval	Isco Flowlink® software	· · · · ·	1				
Communication	Direct connection, optional inte modem with voice messaging,	ernal 2400 bps telephone or optional spread spectrum	1				

# 4230 Bubbler Flow Meter

Isco 4230 Bubbler Flow Meters use an internal air compressor to force a metered amount of air through a bubble line submerged in the flow channel. By measuring the pressure needed to force air bubbles out of the line, the level of the water is accurately determined.

#### **Versatile and Accurate**

The 4230 provides accurate measurement in a variety of conditions. It is not affected by wind, steam, foam, or turbulence. And, because only the bubble tube contacts the flow, corrosive chemicals are not a problem. The 4230 also resists damage by lightning and debris, making it ideal for storm water applications.

Automatic Drift Compensation allows the 4230 to compensate for transducer drift. This makes our bubbler flow meters the most accurate level measurement technology. In standby applications, such as storm water runoff monitoring, Automatic Drift Compensation also allows the 4230 to maintain its level calibration indefinitely.

## **Dependable Operation**

The 4230 is not affected by suspended solids and rapidly changing head heights that can cause problems for some bubbler flow meters. Automatic bubble line purging prevents clogging. And,built-in software senses rapidly rising heads and increases the bubble rate to maintain maximum accuracy.



A 4230 Bubbler paces an Isco 3700 Sampler to collect flow proportioned samples.

Flow Meter					
Size (H x W x D) (without power source)	15.5 in x 11.5 in x 10.5 in	39.4 cm x 29.2 cm x 26.7 cm	Data Storage Memory Capacity         80,000 bytes (approximately 40,000 readings) d		
Weight (without power source)	19.1 lbs	8.6 kg		a maximum of 12 memory partitions; equal to 100 days	
Material	High-impact molded polysty	rene structural foam		readings at 15 minute intervals, plus 3.000 sample events	
Enclosure (self-certified)	NEMA 4X IP65		Setup and Data Retrieval	Isco Flowlink® software	
Power	12 to 14V DC, 16 mA average	je at 12.5V DC (printer set	Communication	Direct connection, optional internal 2400 bps	
	at 1 in/hr (2.5 cm/hr), 1 bubbl purge, and continuous level i	le per second, 15 minute reading interval)		telephone modem with voice messaging, or optional spread spectrum wireless module	
Typical Battery Life	(printer set at 1 in/hr (2.5 cm	hr), 1 bubble per second,	Data Retrieval (optional)	Isco 581 Rapid Transfer Device (RTD)	
024 Nickol Cadmium Patton	15 minute purge, and contin 7 to 10 days	uous level reading interval)	Voice Messaging	Calls up to 5 telephone num	bers with programmable
946 Lead-Acid Battery	10 to 15 days		(with optional internal telephone modem)	combinations of any two of l	evel flow rate rainfall pH
948 Lead-Acid Battery	60 to 90 days			DO, conductivity, and tempe	erature
Program Memory	Non-volatile programmable	flash: can be undated via	Analog Outputs (optional)	Up to 3 isolated internal outp	uts, 0 to 20 mA or 4 to 20 mA,
ogi ann nonnor j	interrogator port without ope	ning the enclosure		scaleable based on level, flo	w rate, pH, DO, conductivity,
Display	Backlit LCD, 2-line, 80-charac	ter		or temperature, into a maxir	num of 750 ohms each
Level-to-Flow Rate			Relay Outputs	2 form C relays with field sel	ectable trip points based
Conversions			Sorial Output		in response to command
Weirs	V-notch, rectangular with an	d without end contractions,	Senai Output	or automatically at selectabl	e time intervals ASCII comma
	Cipolletti, Isco Flow Metering	) Inserts		separated values at 1200, 2	400, 4800, or 9600 bps
Flumes	Parsnall, Palmer-Bowlus, Le	eopold-Lagco, Trapezoidal,	Operating Temperature	0° to 140°F	-18° to 60°C
Manning formula	Round LL-channel rectange	ılar tranezoidal	Storage Temperature	-40° to 140°F	-40° to 60°C
Data Points	Four sets of 50 level-flow rate	te points	Bubbler		
Equation	Two-term polynomial	·· · · · · · · · · · · · · · · · · · ·	Range	0.01 to 10 ft	0.003 to 3.05 m
Totalizers			Level Measurement Accuracy	0.01101010	0.000 to 0.00 m
LCD	9-digit, floating decimal poin	t, resettable	Linearity Repeatability and	Level* Frror	Level* Frror
Mechanical	7-digit, non-resettable (optio	nal)	Hysteresis at 72°F (22°C)	0.01 to 1.0 ft ±0.005 ft	0.003 to 0.31m ±0.002 m
Rain Gauge Input	Contact closure, normally or	ben	, , ,	0.1 to 5.0 ft ±0.010 ft	0.03 to 1.52 m ±0.003 m
Resolution	0.01 or 0.004 in	0.25 or 0.1 mm		0.1 to 10 ft ±0.035 ft	0.03 to 3.05 m ±0.011 m
Parameter Inputs	pH, dissolved oxygen, cond	luctivity, and temperature (with	Temperature Coefficient	±0.0003 x level	±0.0009 x level
	optional YSI 600 Multi-Para	meter Water Quality Monitor);	Maximum error within compen-	x temperature change	x temperature change
	pH and temperature (with o	ptional Isco 201 Parameter	sated temperature range (per	from 72°F	from 22°C
	IVIODUIE); OF DISSOIVED OXYD	en and temperature (with	degree of temperature change)	where level is	where level is
Sampler Activation Conditions	Enabled disabled AND and	I OP combinations of any two of	Automatic Drift Correction	After a E minute warm up no	
Complete Region Octourt	level, flow rate, rainfall, pH, D	O, conductivity, and temperature	Automatic Drift Correction	corrected to ±0.002 ft (±0.00	006 m) at intervals
Sampler Pacing Output	I 2V puise		Long Temp Lough	between 2 and 15 minutes	
Sampler input	Event mark, bottle number		Calibration Change	Typically 0.5% of reading pe	r vear
Pacording Modes	Lin to 3 graphs of level flow	rate nH DO conductivity and	Ambient Operating	Typically 0.070 of redaining pe	
Recording Modes	temperature vs time: include	es totalized flow. Rainfall and	Temperature Range	0° to 140°F	-18° to 60°C
	sampler events (time and b	ottle number) are also recorded	Compensated Temperature		
Speed	Off, 0.5, 1, 2, 4	Off, 1.25, 2.5, 5, 10 cm/per bour	Range	32° to 140°F	0° to 60°C
Recording Span	User selectable with multiple	e over-ranges	Actual vertical distance betwee	מו נווב בוום טו נווב שמשטוב ווווב מווט	line liquiu surface
Resolution	1/240 of recording span	j			
Reports Printed	Flow meter program, 2 inde	pendent time interval reports, history			
Interval Report Contents	Site number: time interval: to	otal flow: minimum, maximum			
	and average flow rate, level,	pH, DO, conductivity, and temp-			
	erature, and time of occurre	ence; interval flow; total rainfall;			
	number of samples, flow me	eter history and sampler history			
Character Size	0.09 in high x 0.07 in wide (2	2.4 mm x 1.7 mm), 12 pitch			
Paper	4.5 in wide x 58 ft. (11.4 cm x replaceable roll	: 17.7 m) plain white paper,			
Ribbon	19.7 ft (6.0 m) black nylon, r	eplaceable			

# 4250 Area Velocity 🔁 Flow Meter

The sensor on the Isco 4250 uses patented\* Doppler technology to directly measure average velocity in the flow stream. An integral pressure transducer measures liquid depth to determine flow area. The 4250 then calculates flow rate by multiplying the area of the flow stream by its average velocity.

The 4250 gives you greater accuracy in applications where weirs or flumes are not practical, or where submerged, full pipe, surcharged, and reverse flow conditions may occur. And you don't have to estimate the slope and roughness of the channel.

## **Easy Setup**

The 4250's Doppler system continuously profiles the flow stream. This saves you time by eliminating profiling and calibration required by electromagnetic systems.

## Maintenance-free

The streamlined 4250 sensor sheds debris and withstands corrosive flow stream chemicals. And, unlike electromagnetic probes, the sealed Isco sensor resists fouling by oil and grease, so you're not bothered with frequent cleanings. You can count on the Isco 4250 for long-term, dependable operation.



The 4250 Area Velocity Flow Meter is ideal for sites where submerged, full pipe, surcharged, or reverse flows may occur.

\*US Patent Nos. 5,371,686 and 5,557,536



Isco offers both Standard and Low Profile Area Velocity Sensors to meet your specific needs. The Standard Sensor (right) is more suitable for use in larger pipes and in turbid flows with high concentrations of suspended solids and entrained air, and may be less susceptible to silting.

The Low Profile Sensor senses velocity in flows typically down to 1" (25 mm) in depth, while its streamlined design minimizes flow stream obstruction. In addition, encapsulation in epoxy provides improved chemical compatibility.

Please refer to literature on the Low Profile Area Velocity Sensor for specifications.

## Isco 4250 Specifications

Size (H x W x D)	15 5 in v 11 5 in v 10 5 in	30 / cm v 20 2 cm v 26 7 cm	Voice Messaging	Calls up to 5 tol	anhone numb	ars with programm	able delay
(without power source)	13.5 III X 11.5 III X 10.5 III 57.4 CIII X 27.2 CIII X 20.7 CIII		(with optional internal	between calls, activated based on AND and OR combinations			
Weight (without power source)	17.3 lbs	7.81 kg	telephone modem)	of any two of lev	el, velocity, flo	w rate, rainfall, pH	, DO,
Material	High-impact molded polystyre	ne structural foam		conductivity, and	d temperature		
Enclosure (self-certified)	NEMA 4X IP65		Analog Outputs (optional)	Up to 3 isolated internal outputs, 0 to 20 mA or 4 to 20 mA,			
Power	12 to 14V DC, 14 mA average	at 12.5V DC (printer	1	scaleable based	on level, velo	city, flow rate, pH, D	)O, conduc-
	set at 1 in/hr (2.5 cm/hr), 1 mir	nute level reading interval,	tivity, or temperature, into a maximum of 750		aximum of 750 ohn	is each	
	and 5 minute velocity reading	interval)	Keiay Oulputs	2 Torm C relays with field selectable trip points based on flow rate (with optional High/Low Alarm Polovs)		ased ou	
Typical Battery Life	(printer set at 1 in./hr (2.5 cm/h	r), 1 minute level reading,	Serial Output	Liow rate (with optional High/Low AldHi Keldys)		mand or	
	interval, 5 minute velocity read	ing interval)		automatically at	automatically at selectable time intervals ASCII comma		comma
934 Nickel-Cadmium Battery	8 to 11 days		4	separated value	es at 1200, 240	00, 4800, or 9600 k	ps
946 Lead-Acid Battery	12 to 16 days		Operating Temperature	0° to 140°F -18° to 60°C			
948 Lead-Acid Battery	75 to 90 days		Storage Temperature	-40° to 140°F		-40° to 60°C	
Program Memory	Non-volatile, programmable fla	ash; can be updated via	Area Velocity Sensor (see	e separate data	sheet for l	ow-profile sens	or)
Display	Packit LCD 2 line 00 chorester	ng me enclosure	Length	6.6 in		16.8 cm	
Lovel to Area Conversions	Dackiil LCD, 2-IINE, 80-CNAPACTER		Width	1.6 in		4.1 cm	
Chapped chappes	Dound II chanod roctongular	tranozoidal	Height	1.2 in		3.0 cm	
Data noints	Four sets of 50 lovel area peir	, ii apezuiudi hte	Nose Angle	35° from horizo	ntal		
Lovel-to-Flow Pato	T our sets of 50 level-died poll	10	Cable Length				
Conversions			Standard range probe	25 ft		7.6 m	
Weirs	V-notch, rectangular, and Cinc	olletti	Extended range probe	50 ft		15.2 m	
Flumes	Parshall, Palmer-Bowlus, Leo	pold-Lagco, Trapezoidal	Cable Diameter	0.37 in		0.9 cm	
	H, HS, HL		Weight (including cable)				
Manning formula	Round, U-channel, rectangula	r, trapezoidal	Standard range probe	2.1 lbs		0.96 kg	
Data Points	Four sets of 50 level-flow rate	points	Extended range probe	3.9 lbs		1.8 kg	
Equation	Two-term polynomial		Level Measurement				
Totalizers			Method	Submerged pres	sure transduce	er mounted in the fl	ow stream
LCD	Total, forward, and reverse flor	w; 9 digits each, floating	Transducer Type	Differential linea	ir integrated ci	rcuit pressure trans	sducer
	decimal point, resettable		Range			0.045 1 0.05	
Mechanical (optional)	Total flow, 7 digits, non-resettable		Standard range probe	0.05 to 10 ft		0.015 to 3.05 m	
Rain Gauge Input	Contact closure, normally ope	n	Extended range probe	0.05 to 30 ft		0.015 to 9.14 m	
Resolution	0.01 or 0.004 in	0.25 or 0.1 mm	Iviaximum Allowable Level	20.8			
Parameter Inputs	pH, dissolved oxygen, conduct	tivity, and temperature (with	Stanuard range probe	2011		0.1 []] 12.2 m	
	optional YSI 600 Multi-Parame	eter Water Quality Monitor);		Non-linearity ro	neatability and	hystorosis at 25°	C (77°E)
	Module)	unaniscu zu i Pal'amelei	Accuracy	(does not includ	e temnerature	coefficient)	U(// T)
Sampler Activation Conditions	Enabled disabled AND and C	R combinations of any two of	1	Level*	Error	Level*	Error
	level, velocity, flow rate, rainfal	I, pH, DO, conductivity. and	Standard range probe	0.033 to 5.0 ft	±0.008 ft/ft	0.01 to 1.52 m	±0.008 m/m
	temperature	· · · · · · · · · · · · · · · · · · ·		> 5.0 ft	±0.012 ft/ft	> 1.52 m	±0.012 m/m
Sampler Pacing Output	12V pulse		Extended range probe	0.05 to 15 ft	±0.03 ft	0.015 to 4.57 m	±0.009 m
Sampler Input	Event mark, bottle number			0.05 to 21 ft	±0.09 ft	0.015 to 6.40 m	±0.027 m
Printer				0.05 to 30 ft	±0.30 ft	0.015 to 9.14 m	±0.09 m
Recording Modes	Up to 3 graphs of level, velocity, flow rate, pH, DO, conductivity, and temperature vs time; includes totalized flow. Rainfall and		Iemperature Coefficient	Maximum error within compensated temperature range			
				(per degree of temperature change)		Frror	
Chood	sampler events (time and bottle	e number) are also recorded	Standard range probe	0.05 to 4 0 ft	+0.005ft/°F	0.015 to 1 22m	+0.0027m/°C
Speea	UIT, U.5, 1, 2, 4	UIT, 1.25, 2.5, 5, 10	Grandara rango probo	4.0 to 10 ft	±0.007ft/°F	1.22 to 3.05 m	±0.0038 m/°C
Pecording Span	Liser selectable with multiple of		Extended range probe	0.05 to 30 ft	±0.008ft/°F	0.015 to 9.14 m	±0.0044 m/°C
Resolution	1/2/0 of recording span	nier- and under-ranges	Velocity Measurement				
Reports Printed	Flow meter program 2 indone	ndent time interval reports	Method	Doppler ultrasor	nic		
	flow meter history, sampler his	tory	Frequency	500 kHz			
Interval Report Contents	Site number: time interval: tota	al, forward and reverse flow	Typical minimum depth				
	minimum, maximum, and aver	rage flow rate, level, velocity,	for velocity measurement	0.25 ft		75 mm	
	pH, DO, conductivity, and tem	perature, and time of occur-	Range	-5 to +20 ft/s		-1.5 to +6.1 m/s	
	rence; interval flow; total rainfa	II; number of samples, flow	Accuracy	Velocity	Error	Velocity	Error
Character Cine	meter history and sampler hist		(Uniform velocity profile)	-5 to +5 ft/s	±0.1 ft/s	-1.5 to +1.5 m/s	±0.03 m/s
Character Size	0.09 in nigh x 0.07 in wide (2.4	+ mm), 12 pitch	4	5 to 20 ft/s	±2% of	1.5 to 6.1 m/s	±2% of
Paper	4.5 IN WIDE X 58 ft (11.4 cm x 1	7.7 m) plain white paper,	Decolution	10.024.8%	reauing	10.0072 m/s	reauing
Pibbon	10.7 ft (6.0 m) black pylon ror	lacaabla		±0.024 II/S		±0.0073 m/s	
Data Storage Momory	80.000 bytes (approvimately 4	naceable	Compensated Temperature	32° to 100°E		0° to 38°C	
Capacity	a maximum of 12 memory par	titions: equal to 60 days of	Materials	JZ 10 100 F		0 10 30 0	
Supulity	level, velocity, rainfall. pH. DO.	a maximum or 12 memory partitions; equal to ou days of Mat level, velocity, rainfall, pH, DO, conductivity, and temperature		Polyhutadiono h	ased nolvurot	hane stainless ste	اص
	readings at 15 minute interval	s, plus 3,000 sample events.	Cable	Polwinvl chloride	(PVC) chlorin	ated polyvinyl chlori	de (CPVC)
Setup and Data Retrieval	Isco Flowlink® software	•					
Communication	Direct connection, optional interna	l 2400 bps telephone modem	* Actual vertical distance betwee	n the area velocity	sensor and the	e liquid surface	
	with voice messaging, or optional	spread spectrum wireless module					
Data Retrieval (optional)	Isco 581 Rapid Transfer Devic	ce (RTD)	]				

## **4200 Series Flow Meter Accessories**



**674 Rain Gauge** Tipping bucket design accurately measures on-site rainfall.



2102 Wireless Module Reduces the need for confined space entry by providing remote data retrieval from monitoring instruments.



581 Rapid Transfer Device (RTD) Transfers data from flow meters to PC for analysis with Isco Flowlink<sup>®</sup>software.



ProHanger The sure way to suspend a flow meter or sampler inside a manhole. All-stainless construction.





**Ultrasonic Sensor Cable Clamp** Securely suspends the sensor by its own cable.

**Ultrasonic Sensor Cable Straightener** Straightens the end portion of the sensor cable.



**Ultrasonic Sensor Mounting Bracket** Allows the sensor to be secured to a vertical surface.

**Ultrasonic Sensor Sunshade** Assures accurate temperature compensation.



**Ultrasonic Sensor Floor Mount** For convenient placement of the sensor onto a horizontal surface.



**Ultrasonic Calibration Target** Allows calibration of the sensor without manhole entrance.



**Quick Disconnect Box** Extends distance between submerged probe and flow meter.



Flow Metering Inserts Specially-designed bubbler flow meter measures flow in sewer pipes without manhole entry.



**Spring Rings** To install flow and parameter sensors in small round pipes.

#### **Scissors Rings**

For sensor installation in large round pipes and manhole inverts.



Street Level Installation Tool Allows installation of flow and parameter sensors into sewers without manhole entry.

## **Power Choices**





**45 Amp-hour Lead-acid Battery** Long-life automotive style battery with carrying case and connect cable.

Nickel-cadmium and Lead-acid Batteries Sealed, rechargeable batteries for portable applications.



High-capacity Power Packs Convert AC power to 12 VDC. Includes



Battery-backed Power Packs AC power packs with a built-in battery for back-up power.

## **Chargers**



Five-station Battery Charger Handles up to five Isco 934 Nickel-Cadmium or 946 Lead-acid batteries at once.



Wall-mount Chargers

Economical and

efficient charging

NOTE: For additional battery or charger information,

request our Power Products Catalog No. L-0104

for single batteries.



Solar Panel Battery Chargers For Isco lead-acid batteries where AC line power is not available. Several sizes offered.



General Purpose 12V Charger 6-Amp portable for lead-acid batteries.

## **Ordering Information**

Model	Part Number	Model	Part Number
4210 Ultrasonic Flow Meter	68-4210-001	4200 Series Options	
4210 Accessories		Telephone modem with voice messaging	68-4200-004
Sensor Cable Clamp	60-3004-129	2102 Wireless Module	68-2000-002
Sensor Cable Straightener	60-3213-061	Analog outputs	
Sensor Mounting Bracket	60-2443-092	- 1 output	60-3214-146
Sensor Sunshade	60-3004-142	- 2 outputs	60-3214-148
Sensor Floor Mount	60-3004-117		60 3214-149
Calibration Target	60-3004-143	4200 Series Accessories	00-5214-154
4220 Submerged Probe Flow Meter		201 pH/Temperature Module w/double junction pH probe	68-4200-002
with 10 ft (3.05 m) level measurement range	68-4220-001	674 Rain Gauge	00 1200 002
4220 Accessories		0.01"	60-3284-001
Quick Disconnect Box	60-3224-003	0.1 mm	68-3280-001
4230 Bubbler Flow Meter		High/Low Alarm Relays	60-3404-028
with 1/16 in x 25 ft (1.6 mm x 7.62 m) Teflon bubble line	68-4230-001	Chart Roller	60-3004-156
with 1/8 in x 50 ft (3.2 mm x 15.2 m) vinyl bubble line	68-4230-002	Isco Flowlink <sup>®</sup> Software	Ask about options
4230 Accessories		581 Rapid Transfer Device (RTD) with transfer cable	68-6700-056
Flow Metering Inserts		ProHanger (for 18" - 24" manholes)	209-9006-04
6" (150 mm) Insert	68-3230-005	Power Products	
8" (200 mm) Insert	68-3230-006	- 934 Nickel-Cadmium battery, 4 A-H	60-1684-040
10" (250 mm) Insert	68-3230-007	- 946 Lead-acid battery, 6.5 A-H	60-3004-106
12" (300 mm) Insert	68-3230-008	948 Lead-acid battery, 45 A-H	68-3000-948
SST bubble tube extension, 1/16" ID	60-1704-018	High-capacity Power Packs	60 1604 000
SST bubble tube extension, 1/8" ID	60-1873-043	Model 913 (120V AC)	60-3004-000
4250 Area Velocity Flow Meter		Battery-backed Power Packs	00-3004-170
with Low Profile Area Velocity Sensor		Model 914 120V AC	60-3004-130
with 10 ft (3.05 m) level measurement range	68-4250-006	Model 924 240V AC	60-3004-160
with Standard Area Velocity Sensor		AC-powered chargers	
with 10 ft (3.05 m) level measurement range	68-4250-001	Model 961 120 VAC (for ni-cad only)	60-3004-059
with Standard Area Velocity Sensor		Model 963 120 VAC (for lead-acid only)	60-3004-198
with 30 ft (9.14 m) level measurement range	68-4250-002	965 Five-station battery charger	68-3000-965
4250 Accessories		General purpose 12V charger	341-0118-12
Quick Disconnect Box	60-3254-004	Solar panel battery chargers	Custom Order

## Flow Measurement Technology Selection Guide

Suitability for Different Applications	Ultrasonic Sensor	Submerged Probe	Bubbler	Area Velocity
Weirs and flumes	Excellent <sup>1</sup>	Excellent	Excellent	Excellent
Channels less than 6 in. (150 mm)	Not recommended	Excellent	Excellent	Not Recommended
Small round pipes, 6 to 8 in. (150 to 200 mm)	Good <sup>2</sup>	Excellent	Excellent	Good
Medium round pipes, 10 to 15 in (250 to 375 mm)	Good <sup>2</sup>	Excellent	Excellent	Excellent
Large round pipes, 15 to 96 in. (375 to 2500 mm)	Excellent <sup>2</sup>	Good	Excellent	Excellent
Irrigation channels and small streams	Excellent <sup>2</sup>	Good	Excellent	Good
Rivers and large streams	Excellent <sup>2</sup>	Good	Excellent	Good
Chemical Compatibility of Sensor				
Organic solvents	Compatible	Not Recommended	Compatible	Not Recommended
Organic acids	Compatible	Not Recommended	Compatible	Not Recommended
Alcohols	Compatible	Compatible	Compatible	Compatible
Esters	Compatible	Not Recommended	Compatible	Not Recommended
Inorganic acids	Compatible	Not Recommended	Compatible	Not Recommended
Inorganic bases	Compatible	Not Recommended	Compatible	Not Recommended
Inorganic salts	Compatible	Compatible	Compatible	Compatible
Performance Under Adverse Conditions				
Strong wind	Not Recommended	Excellent	Excellent	Excellent
Air temperature fluctuations	Very good <sup>3</sup>	Excellent	Very good <sup>3</sup>	Excellent
Steam above liquid	Not Recommended	Excellent	Excellent	Excellent
Foam on liquid	Not Recommended	Excellent	Excellent	Excellent
Flow stream turbulence	Not Recommended	Excellent	Excellent	Excellent
Floating debris	Not Recommended	Excellent	Excellent	Excellent
Floating oil or grease	Not Recommended	Excellent	Excellent	Excellent
Suspended solids	Excellent	Very good	Good	Very Good
Suspended grease	Excellent	Very good	Good	Very Good
Silting	Excellent	Very good	Good	Very good
Liquid temperature fluctuations	Very good <sup>4</sup>	Good <sup>4</sup>	Excellent	Good <sup>4</sup>
Submerged flow	Not Recommended	Not Recommended	Not Recommended	Excellent
Full pipe flow	Not Recommended	Not Recommended	Not Recommended	Excellent
Surcharged flow	Not Recommended	Not Recommended	Not Recommended	Excellent
Reverse flow	Not Recommended	Not Recommended	Not Recommended	Excellent
Maintenance Requirements Caused by Advers	e Conditions			
Silting	None	Occasional	Occasional	Occasional
Suspended solids	None	Occasional	Occasional	Occasional
High grease concentration	None	Occasional	Occasional	Occasional

1. Use with caution in small flumes.

2. There must be adequate space above for mounting sensor.

3. Large air temperature fluctuations will affect accuracy.

4. Large water temperature fluctuations will affect accuracy.

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