Measuring streamflow with Global Water's Flow Probe.

CHAPTER 2.
FLOW METERING

Flow Meters, Loggers, Monitors, and Flumes

Flow Metering Notes

FP111, 211, 311 Flow Probes

Digital Handheld Water Velocity Meters

Easy Streamflow Measurement

You can quickly and easily measure streamflow using Global Water's Flow Probe. Flow is determined by: V (average velocity) x A (cross-sectional area) = Q (flow).

You can calculate the cross-sectional area (A) of water in a round pipe by measuring the water's depth and using the calculation tables included in the Flow Probe's manual. To determine the cross-sectional area for streams and rivers, measure the distance from shore and water depth at various points across the stream to construct a channel profile. These measurements are easy to record by drawing a diagram on graph paper.

The Flow Probe supports two unique methods for determining the average velocity (V) in a stream. 1) For small streams and pipes, move the probe slowly and smoothly throughout the flow until a steady average reading is displayed. This steady reading is the true average velocity for the streamflow. 2) For larger streams and rivers, divide the stream into subsections 2-3 feet wide. We recommend that you draw the subsections on your channel profile and run a measuring tape across the stream for reference. Obtain an average velocity at the center of each subsection by repeatedly moving the probe vertically from the surface to the bottom until a steady reading is displayed. The average velocity times the area of the subsection equals the flow for the subsection. Add all of the subsection flows to obtain the total streamflow.

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Description

Global Water's FP111, FP211, and FP311 Flow Probes are highly accurate water velocity instruments for measuring flows in open channels and partially filled pipes. Each Flow Probe consists of a protected turbo-prop sensor coupled to an expandable probe handle that ends in a digital readout display. The unit incorporates true velocity averaging for the most accurate flow measurements. It is ideal for measuring flows in streams, rivers, canals, stormwater, wastewater, and industrial process waters.

Highly Accurate Turbo-Prop Sensor

The Flow Probe incorporates a unique turbo propeller sensor that uses the most accurate positive displacement technique available for velocity sensing. The turbo-prop is designed to shed debris and is protected inside a 2 inch diameter housing. The probe housing may be placed directly on the bottom of a pipe or streambed for measuring low flows down to 2 inches in depth. The propeller rotates freely on its bearing shaft with no mechanical interconnections for minimal friction. The turbo-prop is easily removed for cleaning or replacement.

Unique Digital Readout Display

The water velocity computer receives an electrical signal from the propeller, amplifies the signal, and converts the reading to feet per second (or meters per second, depending on programming). The large LCD screen displays average, minimum, and maximum water velocity readings. Up to 30 sets of data points can be stored in the computer. These data points can be reviewed on the LCD for later analysis. The housing is water-resistant and incorporates a unique four-button operation for changing functions and resetting the display. The computer is powered by a non-replaceable battery that will last approximately five years with normal use. A low battery warning will be displayed.

Durable, Lightweight Telescopic Handle

The Flow Probe handle can telescope from 3.7 to 6 feet in length (FP111), 5.5 to 15 feet (FP211), or 2.5 to 5.5 feet (FP311). The handle is constructed of anodized aluminum for light weight and long life. The 15 foot length of the FP211, allows for measuring sewer flows from street level and measuring stream flows from low bridges. While the 2.5 foot collapsed length of the FP311 is ideal for carrying into remote flow monitoring areas. A mylar coated staff gauge (graduated in hundredths of a foot and centimeters) is attached to the lower section of the probe for instant water depth measurements and accurate propeller positioning. An optional fin allows you to orient the propeller correctly in turbid water.

Global Water's Flow Probe is ideal for quick, easy, and highly accurate streamflow measurements.

FP111-211 Flow Probes

True Velocity Averaging

You can use the Flow Probe to measure the average water velocity of a channel's flow. As long as you keep the turbo-prop sensor in the flow, the averaging continues. One reading is taken per second, and a continuous average is displayed. Once the reading becomes steady, the true average velocity of the stream is obtained. This allows for highly accurate flow measurements, which average the differences in velocities that occur throughout a flow's cross-section and with water surges over time. The average can be saved by pressing the SAVE button and reviewed later.

Optional Swivel Head

The Swivel Head option allows you to rotate the turbo prop to ± 90 degrees from it's standard position. This option lets the flow probe take water velocity measurements in hard to measure areas such as vertical pipes on water tanks or swimming pool drainage systems.

Specifications

Range	0.3 to 19.9 fps (0.1 to 6.1 mps)
Accuracy	0.1 fps
Averaging	True digital running average. Updated once per second.
Display	LCD , Glare and UV Protected
Control	4 button
Datalogger	30 data sets, MIN, MAX, and AVG
Features	Timer, Low battery warning
Sensor Type	Protected Turbo-Prop propeller with magnetic pickup
Materials	Probe: PVC and anodized aluminum with stainless steel water bearing Computer: ABS/Polycarbonate housing with polyester overlay
Power	Internal Lithium Battery, Approx 5 year life, Non-Replaceable
Operating Temp	-4 to 158° F (-20 to 70° C)
Carrying Case	Padded carrying case included
Certificates	CE Compliance
Weight	FP111: 2 lbs (0.9 kg) FP211: 3 lbs (1.4 kg) FP311: 2.8 lbs (1.3 kg)

Features

- Digital display in ft/sec or m/sec
- Records 30 data sets for later analysis
- Rain-proof digital computer
- Highly accurate easy flow monitoring
- Debris shedding turbo-prop
- Lightweight, rugged, and reliable
- Telescoping handle with staff gauge
- Padded carrying case for easy storage
- CE Certified
- Used by water professionals worldwide since 1990

Applications

Ideal for measuring flows for streams, rivers, canals, stormwater runoff, agricultural runoff, ditches and canals, sewer flows, inflow and infiltration studies, industrial process waters, and more.

Expandable Length	FP111: 3.7 to 6 ft (1.1 to 1.8 m) FP211: 5.5 to 15 ft (1.7 to 4.6 m) FP311: 2.5 to 5.5 ft (0.76 to 1.7 m)

FP111 prop housing with optional orientation fin.

You may also like . . .

Set Up a Stream Gauging Station
Find out more about how to set up a stream gauging station using Global Water's Flow Probe and the WL16 Water Level Logger.
Page 2

Global Water Flumes
Durable, highly accurate, and easy to install flumes for your flow monitoring application.
Starting on Page 40

"Water is life's matter and matrix, mother and medium. There is no life without water."

– Albert Szent-Gyorgyi, Hungarian biochemist and Nobel Prize Winner for Medicine

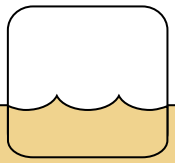
Ordering & Options

Flow Probes

Order No.	Handle Length
FP111	3.7 to 6 ft (1.1 to 1.8 m)
FP211	5.5 to 15 ft (1.7 to 4.6 m)
FP311	2.5 to 5.5 ft (0.76 to 1.7 m)
FP111-S	3.7 to 6 ft (1.1 to 1.8 m) handle w/swivel
FP211-S	5.5 to 15 ft (1.7 to 4.6 m) handle w/swivel
FP-FIN	Detachable orientation fin

Replacement Parts

Order No.	Description
BA2000	Digital Flow Computer
BG0000	Prop/Bushing/Screw Kit
00-155	Flow Probe 111 Case
00-082	Flow Probe 211 Case
BC1150	Flow Probe 311 Case



Managing Inflow and Infiltration Problems

Inflow and infiltration are terms used to describe the ways that stormwater (inflow) and groundwater (infiltration) enter into dedicated wastewater or sanitary sewer systems. Inflow and infiltration (I/I) add clear water to sewer systems and treatment facilities, reducing the system's ability to adequately transport and treat wastewater.

The reduction of I/I should be planned in a long-term monitoring and control program. Initially, a variety of information should be researched, recorded, and mapped so that key locations for sewer flow monitoring can be identified throughout a sewer system's watershed, basins, and sub-basins.

Global Water's FL16 Flow Logger is ideal for measuring wastewater flows and their responses to I/I. The following "rules-of-thumb" can be used in I/I monitoring: monitor for a minimum of 45 days, with 60 days being optimal; measure during 6 to 8 separate rainfall events; monitor during a period of high seasonal groundwater; use one flow meter for every 30,000 to 50,000 feet of pipe; and set the flow meters' recording intervals at 15 minutes. Once monitoring data has been collected and evaluated for accuracy, it can inform system modeling that will help narrow in on I/I sources.

Inspections, cleanings, smoke testing, and dyed-water testing can be employed to pinpoint I/I sources. Once a source has been discovered, a jurisdiction can evaluate rehabilitation and control alternatives. By continuing periodic monitoring, a jurisdiction will be able to evaluate the effectiveness of control efforts, determine new sources of I/I, and maintain the integrity of the system over time.

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FL16 Flow Logger

Water Flow and Temperature Recorder for Partially Filled Pipes, Flumes, and Weirs

Description

Global Water's FL16 Flow Logger will revolutionize the way you collect flow data. The FL16 consists of a sensor and a datalogger that will record over 81,000 depth, temperature, flow, and velocity readings. The FL16 operates on two standard 9 volt batteries, which it monitors so you are never caught off guard with dead batteries.

Many Uses

The FL16 is ideal for a variety of applications, such as: inflow and infiltration studies, storm and waste collection systems, open channels (including sewer and drainage pipes, flumes, weirs, and square channels), and a host of other gravity-flow type systems. With multiple FL16's, you can collect rain event or other flow event data from 5 or 6 sites simultaneously for a minimal investment.

Specially Engineered Sensor

The FL16's specially engineered, non-fouling level sensor works in depths as low as ½" and allows for deployment in manholes and other difficult to access areas without the need to enter the confined space. The sensor is fully encapsulated with marine-grade epoxy so that moisture can never leak in or work its way down the vent tube to cause level sensor failure (as can be the case with other pressure sensors).

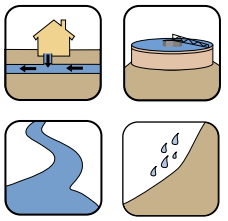
Powerful Flow Logger Software

The FL16 includes user-friendly Windows™-based Flow Logger software that is tailored specifically for calculating flows in partially filled sewer and drainage pipes using the Manning's Equation. Pull-down menus for selecting and entering the necessary pipe or primary device information make programming quick and easy. A unique calibration feature allows users to view calculated water velocity, compare this to actual measured data, and adjust the flow parameters to calibrate the flow conditions of a specific application. Flow equations for over 40 standard flumes and weirs are provided, and users can define their own custom lookup tables to convert water level to flow for virtually any application. Once configured, all setup and flow parameters are stored in the FL16's memory and are uploaded to the software automatically upon connection. This information can also be saved to a file for later use, allowing the FL16 to be deployed in multiple locations without the need to re-enter the flow parameters each time it is moved. The FL16 also includes Windows™ CE-based PDA software for easy field data collection.

Flexible Options

The FL16 Flow Logger package includes the weatherproof logger unit, the non-fouling sensor with 25 ft (7.6 m) of heavy duty cable, and the Flow Logger and PDA software packages. Optional cable lengths are available up to 500 ft (152.4 m) (cable length is measured from the top of the datalogger to the bottom of the sensor). Choose the FL16U model for a USB interface, which is best for direct to PC or laptop communication; or select the FL16S serial version, which is best for Windows™ CE-based PDA's. Our optional FLMNT protective housing includes hardware for mounting to a manhole step or other structure, providing for easy installation and replacement in the field.

Applications



Ideal for inflow and infiltration studies, storm and waste collection systems, sewer and drainage pipes, flumes, weirs, square channels, and other gravity-flow type systems.

FL16 Flow Logger

Bluetooth Capability

The AK1500 Bluetooth Adaptor was designed to eliminate the need for custom PDA cables to communicate between your PDA and the FL16. The adaptor connects to the FL16's serial port using the same interface cable provided with the software-cable kit.

Specifications

Datalogger

Memory	Non-volatile flash memory
Power	Two 9VDC alkaline batteries
Battery Life	Up to 1 year (depending on recording intervals)
Resolution	12 bit
Moisture Protection	Silicon coating (prevents damage to electronics from condensation)
Temperature	-40° to +185°F (-40° to +85°C) Batteries may not apply Lithium batteries recommended for operation below 32°F (0°C)
Humidity	0-95% non-condensing
Storage Capacity	81,759 time/date stamped datapoints (including battery voltage)
Sample Modes	High Speed (10 samples per second), Fixed Interval (programmable from 1 sec. to >1 year), Logarithmic, Exception
Data Overwrite	Select memory wrap or unwrap (unwrap will stop logging once memory is full)
Clock	Synchronizes to user's computer; accuracy of 0.0025% or 1 minute in 1 month; format is m/d/yr and hr/min/sec
Enclosure	Stainless steel UV protected PVC Vented for barometric pressure compensation
Communication Port	FL16S: RS-232 4-pin circular connector FL16U: USB Type B Selectable Baud Rates: 9600, 19200, 28800, 38400, 57600, 115200
Dimensions	1-7/8 inch dia. x 11-1/2 inch long, fits in 2 inch well (4.8 cm dia. x 29 cm long)
Weight	2.4 lbs (1 kg) (includes logger, 25 ft cable, and sensor)

Global Logger Flow Software

Compatibility	Microsoft's Windows™ 98, ME, 2000, NT, XP, and Vista
Features	Tabular Display/Printout Data in standard spreadsheet format (CSV) Programmable alarm start and stop times Field calibration software and help files included

Features

- Compact, self-powered and easy to use
- Over 81,000 flow, velocity, level, and temperature readings
- Free user-friendly Windows™ and Windows™ CE-based PDA software included
- USB or serial communications
- No confined space entry required for sensor deployment
- User-programmable start and stop alarms, engineering units, and field calibration setup

Cable

Conductors	4 each 22 AWG
Material	Marine grade polyurethane jacket, polyethylene vent tube, aluminum mylar shield
Outside Diameter	0.306 inch (7.8 mm)
Temperature Range	-22° to +185° F (-30° to 85°C)
Length	Standard 25 ft (up to 500 ft from factory)
Cable	~0.7 oz/ft (65 g/m)

Flow Sensor

Sensor Element	Silicone Diaphragm, Wet/Wet Transducer
Pressure Range	0 to 3 ft of water
Linearity and Hysteresis	±0.1% full scale
Pressure Accuracy	±0.1% full scale at constant temperature, ±0.2% over 32°F to 70°F (0° to 21.1°C) range
Overpressure	2 x full scale range
Burst Pressure	10 x full scale range
Resolution	Infinite (analog)
Output Currents	Level: 4-20mA ±1mA full scale Temperature: 0-10mA ±1mA full scale
Supply Voltage	10 to 36VDC
Current Draw	Combined level and temperature output currents
Warm Up Time	3 seconds recommended
Operating Temperature	0° (not frozen) to +185°F (-17°C (not frozen) to 85° C)
Compensation	Dynamic temperature compensation 32 to 70°F (0° to 21.1°C), automatic barometric pressure compensation
Material	316 stainless steel outer sleeve, PVC diffuser and strain relief
Dimensions	9 inch long x 1 inch dia. (22.9 cm long x 2.5 cm dia.)
Weight	~9 oz (250 g)

Temperature Sensor

Temperature Range	32° to 100°F (0 to 50° C)
Accuracy	±1.0% of reading

Ordering & Options

Flow Loggers

Order No.	Comm. Port	Sensor Range (Ft)	Cable Length (Ft)
FL16U	USB	0 to 3	25
FL16S	Serial	0 to 3	25

Options

Order No.	Description
WLEXC	Extra Sensor Cable (up to 500 ft)

Accessories

Order No.	Description
PDAWL16	PDA Package
FLMNT	Protective Mounting Sleeve
AK1500	Bluetooth External Adapter

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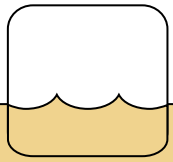
Barometric Pressure Compensation
The FL16 is automatically compensated for barometric pressure changes. Find out more about this critical asset.
Page 6

FC200 Open Channel Flow Monitor

Open Channel Flow Meter and Flow Totalizer



Measuring Open Channel Flows

For any open channel that is free flowing, there is a specific relationship between the depth of water and the flow rate. Whenever a given depth occurs, there will always be the same flow. Therefore, if the flow rate is known for each depth, a depth-to-flow relationship can be constructed.

Primary Device Flows

When using a primary device to measure flows, such as a measuring flume or weir, there is a mathematical relationship between depth and flow.

Global Water's FC200 Open Channel Flow Monitor is pre-programmed with depth-to-flow relationship tables for over 20 flumes and weirs. You can digitally select the correct depth-to-flow relationship for your application, and the Open Channel Flow Monitor's LCD screen will automatically display flow rate measurements for any depth that is reached. The flow rate is also averaged over time to display total flow.

Custom Depth-to-Flow Relationships

When measuring flows in a channel that does not have a primary device, you must construct your own depth-to-flow table. You can do this by measuring the flow using Global Water's Flow Probe (see page 22) when the channel is at several different depths of water.

In addition to the pre-programmed depth-to-flow relationships, you can purchase the FC200-C with a custom depth-to-flow equation or look up table to meet the needs of your specific application. Please specify your custom programming information when placing your order.

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Description

Global Water's FC200 Open Channel Flow Monitor is reliable and accurate for measuring and totalizing flows for all flumes and weirs, as well as for any gravity-type open-channel application. The FC200 measures water depth with Global Water's highly accurate pressure transducer, and the unit's electronic circuitry calculates and displays flow rate and total flow values for any depth-to-flow relationship in any engineering units. The Open Channel Flow Monitor is easy to set up in the field using a unique four-button programming system.

Accurate Depth Sensor

Our Open Channel Flow Monitor measures water depth with a highly accurate, fully submersible water level sensor constructed of stainless steel. The standard level range is from 0 to 3 ft of water, which provides for accurate flow measurements even with depth changes as small as a fraction of an inch. Simply mount the pressure transducer slightly below the "zero" flow depth of the channel, upstream from the throat of a flume or weir. For open channels with no primary device, mount the sensor below the lowest expected water depth. The sensor includes 25 ft of waterproof cable. In addition, the sensor has a 2-wire 4-20 mA signal, so you can extend the cable out of water with standard, twisted-pair signal wire and mount the flow computer up to 1,000 feet away from the sensor location.

We also offer an ultrasonic water level sensor model (FC200-U) that allows the Open Channel Flow Monitor to measure semi-solid flows or other flows that are not suitable for a standard submersible pressure transducer (for sensor specifications, see the WL700 on page 10). This option includes a 0 to 3 ft ultrasonic sensor on 10 ft of cable. We recommend that the ultrasonic sensor option only be used in areas where AC power is available. A submersible pressure transducer should be used for applications in areas without AC power.

Capable Displays and Outputs

The Open Channel Flow Monitor displays the 5-digit flow rate on an LCD screen and the totalized output on a second LCD display. The displays read in user-defined units of flow, including mgd, csf, gpm, and m^3s. The FC200 produces an analog 4-20 mA output signal that is proportional to flow. You can use this output for chart recorders, dataloggers, or as an input to telemetry or process control systems. In addition, the meter has a flow proportional output signal for triggering water samplers. To add datalogging capabilities, select the FC200-D, which includes the FC200 as well as an internal serial version of Global Water's GL500-2-1 Global Logger (see specifications on page 123).

Powerful Digital Flow Computer

The FC200 has powerful internal electronic circuitry that calculates and totalizes flow. You can easily select your desired engineering units and depth-to-flow relationships

Applications

Ideal for flumes, weirs, and any other gravity-flow type system.

You may also like . . .

Global Water Flumes
Durable, highly accurate, and easy to install flumes for your flow monitoring application.
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FC200-S Sewer Flow Monitor
Measure flows in stormwater, wastewater, and other partially-filled, gravity-flow pipelines without the need for a flume or weir.
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FC200 Open Channel Flow Monitor

(from over 20 pre-defined tables) using the unit's four front panel push buttons. User programming does not require you to open the unit's enclosure. The unit's manual includes programming information, including depth-to-flow tables for all standard flumes and weirs. In the event that our preprogrammed tables do not meet your needs, you can purchase a custom version (FC200-C) by contacting Global Water.

Rugged Enclosure

The FC200's enclosure is made of weatherproof injection molded plastic. It is suitable for use in a wide variety of environments. The enclosure can be wall mounted and fitted with conduit for sensor and power connections, if required. The FCBAT Battery Option includes a heavy-duty weather resistant enclosure for the FC200 and a 12V, 4.5Ah rechargeable battery.

Features

- Easy to use interface with user selectable flow tables
- Simple four button programming
- Digital LCD screen
- Highly accurate depth sensor
- Output signal for recorders or displays
- Sampler triggering output
- Water resistant enclosure
- Over 20 flumes and weirs pre-programmed
- Custom lookup tables available

> "Thousands have lived without love, not one without water."
>
> – W.H. Auden

Specifications

Flow Monitor

Rate Display	5 digit + decimal place, LCD
Totalizer Display	6 digit
Accuracy	+0.01% + the depth-flow-table error
Flow Units	cfs, gpm, m^3s, mgd
Totalizer	Related to flow units
Enclosure	NEMA 4X (IP67)
Power	120 VAC to 240 VAC Optional battery power available
Current Draw	60mA typical, 100mA max when the output relays are on, and 100uA in sleep mode
Pre-Defined Tables	Parshall: 1", 2", 3", 6", 9", 12" Palmer-Bowlus (4D): 4", 6", 8", 10", 12", 15" Weir: 45° V notch, 90° V notch, 1' rectangular, 2' rectangular H Flume: 0.4HS, 0.6HS, 0.5H, 0.75H, 1.0H, 1.5H, 2.0H Trapezoidal: 60°
Custom Table	Please provide Global Water with a depth-to-flow equation or look up table at time of order (allow for longer lead times)
Dimensions	4-3/4x8x3 inch (12 x 20 x 7.5 cm) (WxHxD)
Weight	3.4 lbs (1.54 kg)

Depth Sensor

Sensor Element	Silicone Diaphragm, Wet/Wet Transducer
Range	0 to 3 ft
Linearity and Hysteresis	±0.1% full scale
Accuracy	±0.1% full scale at constant temperature, ±0.2% over 35 - 70°F range (1.37 - 21.1°C)
Overpressure	Not to exceed 2x full scale range
Resolution	Infinitesimal (analog)
Outputs	4-20 mA or 0.5 to 2.5 VDC across 125 ohms
Supply Voltage	8 to 36 VDC
Current Draw	Same as sensor output
Warm-up Time	3 seconds recommended
Operating Temperature	0°F (not frozen) to 185°F (-17°C (not frozen) to 85°C)
Compensation	Uses dynamic temperature compensation 30 to 70°F (-1.1 to 21.1°C), automatic barometric pressure compensation
Materials	304L stainless steel, stainless steel microscreen with hundreds of holes to prevent fouling, electronics are fully encapsulated in marine grade epoxy, guaranteed not to leak
Dimensions	5-1/2 in long x 13/16 in dia. (14 cm long x 2 cm dia.)
Weight	1/2 lb (227 g)

Ordering & Options

Open Channel Flow Monitors[1]

Order No.	Sensor Type	Sensor Range (Ft)	Cable Length (Ft)
FC200	Pressure	0 to 3	25
FC200-U[2]	Ultrasonic	0 to 3	10
FC200-D[3]	Pressure	0 to 3	25
FC200-C[4]	Pressure	Custom	Custom

1) Please specify flume/weir type when placing order.

2) For sensor specifications, see the WL700 on page 10.

3) The FC200-D includes the FC200 and an internal serial version of the GL500-2-1 (see page 123).

4) For custom tables not identified in specifications, please contact Global Water with a depth-to-flow equation or look up table when placing order and allow for longer lead times.

Options

Order No.	Description
FCBAT	Battery Option (includes heavy-duty enclosure and 12V, 4.5 Ah rechargeable battery)
WLEXE	Extra Cable (up to 500 ft (152.4 m))
01-842	Extra Cable (up to 500 ft (152.4 m)) for FC200-U only

FC200-S Sewer Flow Monitor

Sewer System Flow Meter and Totalizer for Open Channel Flows

Features

- Unique sensor can be installed without entering confined space
- Quick, easy programming with user selectable flow tables
- Output signal for recorders or displays and samplers

Specifications

Power	120 VAC to 240 VAC, Optional battery power available
Current Draw	60mA typical, 100mA max when the output relays are on, and 100uA in sleep mode
Enclosure	NEMA 4X (IP67)
Rate Display	5 digits + decimal place, LCD
Totalizer Display	6 digit
Totalizer	Related to flow units
Outputs	Flow rate display, total flow display, scalable 4-20 mA output, scalable pulse and relay output
Accuracy	Pressure transducer: ±0.2% full scale; Flow Monitor: ±0.1% + the depth flow table error
Engineering Units	cfs, gpm, m^3s, mgd
Weight	3.8 lbs (1.72 kg)
Dimensions	4-3/4x8x3 inch (12x20x7.5 cm) (WxHxD)
Pre-Defined VCP Sanitary Sewer Pipe Tables	Roughness Factor: 0.014 Pipe Diameter: 6", 8", 12" Pipe Slope: 1/2%, 1%, 1-1/2%, 2%, 3%, 4%, 6%, and 8%

Please see flow sensor and cable specifications for the FL16 Flow Logger (page 24).

Ordering & Options

Sewer Flow Monitors[1]

Order No.	Description
FC200-S	Sewer Flow Meter
FC200-SC[2]	FC200-S with Custom Programming
FC200-SD	FC200-S with Internal Serial Global Logger

1) Please specify sewer pipe information when placing order.
2) Please contact Global Water for customization.

Options

Order No.	Description
FCBAT	Battery & Enclosure Option
WLEXE	Extra Sensor Cable (up to 500 ft (152.4 m))

Description

The FC200-S Sewer Flow Meter provides a reliable and accurate way for you to measure flows in stormwater, wastewater, and other partially filled, gravity-flow pipelines without the need for a flume or weir. Based on our popular FC200 Open Channel Flow Meter (see page 26), the FC200-S Sewer Flow Meter includes 24 lookup tables that have been preprogrammed for the most common gravity-fed sewer pipes with diameters from 6 to 12 inches and slopes of 0.5% to 8%.

Unique Rugged Sensor

Our unique FC200-S sensor resists fouling and the effects of velocity changes. It is designed so that you can place it in a pipe without having to enter a manhole or other confined space. The sensitive 0 to 3 ft depth sensing element provides highly accurate measurements in flow depths as low as three quarters of an inch. Since the sensor is a 2-wire, 4-20 mA transmitting device, the FC200S flow computer may be mounted up to 1,000 feet away from the sensor location. The sensor and flow computer can be connected with inexpensive signal wire, which allows you to mount the FC200-S in a safe and convenient location.

Capable Displays and Outputs

The FC200-S displays the 5-digit flow rate on an LCD screen and the totalized output on a second LCD display. You can choose the displayed units of flow: mgd, cfs, gpm, or m^3s. The proportional analog 4-20 mA output signal can be used for chart recorders, dataloggers, or telemetry and process control systems. In addition, the FC200-S has a flow-proportional pulse output signal for triggering water samplers or flow pacing chemical feed pumps.

Powerful Digital Flow Computer

The FC200-S's powerful flow computer calculates and totalizes flow based on your selection of desired engineering units and depth-to-flow relationships from easy-to-use, preprogrammed lookup tables. You can make selections quickly from the front of the unit with four push buttons, so you never need to open the enclosure to modify the unit's settings.

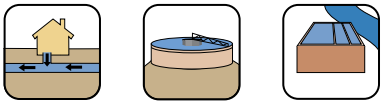
Customize for your Application

In the event that our preprogrammed tables do not meet the needs of your application, custom tables can be factory-programmed into the FC200-S by providing Global Water with your pipe's diameter, slope, and construction material. Please contact Global Water regarding this option (Order No. FC200-SC).

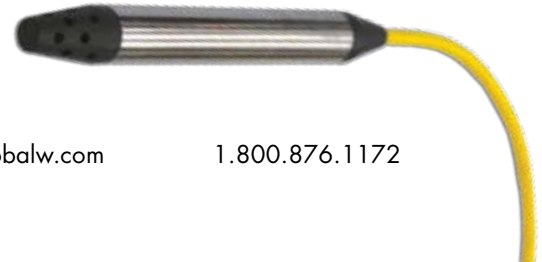
What's in the Box

The FC200-S Sewer Flow Meter includes the flow computer in a NEMA 4X enclosure, a sewer flow sensor with 25 ft of heavy duty vented cable, and built-in lookup tables with pipe material, diameter, and slope information (please verify your pipe requirements when placing your order). To add datalogging capabilities, select the FC200-SD, which includes the FC200-S as well as an internal serial version of Global Water's GL500-2-1 Global Logger (see specifications on page 123). For remote sites or temporary flow studies, we also offer the FCBAT Battery & Enclosure Option, which includes a heavy duty weather-resistant enclosure and a 12V, 4.5Ah rechargeable battery.

Applications



Ideal for inflow and infiltration studies, treatment plant discharge, collection system flow monitoring, gravity-fed raw water intakes, gravity-fed backwash discharge, and more.



WMX101-104 Magnetic Flow Meter

Flanged Magnetic Meter for Full Pipe Flows

Description

The WMX101-104 Series flanged magnetic flow meters offer the perfect replacement for your old industrial mechanical turbine or propeller flow meters. Because the WMX meters have no rotor to stop turning or bearings to wear out, they are virtually maintenance free, especially in applications where debris or sand would foul most industrial mechanical flowmeters. The WMX101-104 meters are also designed to work with minimal straight pipe run requirements, which is ideal when you have very little space between the meter and an elbow.

Rugged Housing and Display

The WMX's electronics are housed in a rugged NEMA 4X aluminum enclosure with a 2-line LCD that clearly displays the flow rate and totalizer values. The housing is fitted with tamper-evident features. The display units are in US gallons and cannot be changed in the field. However, you may request flowmeter displays in the following units:

- Rate: mgd, cfm, lpm
- Total: c^3, m^3, Ml

Flexible Output and Power

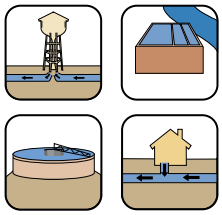
The meters have a solid state pulse output that allows connection to a variety of devices, such as a PLC, telemetry system, datalogger, or the FT420W wall mounted display. The AO55W pulse-to-analog converter can be added if a 4-20 mA signal is required.

You can power the WMX101 meters from 12-24 VDC power supplies. Their low power requirements make them ideal for solar powered applications. The WMX104 meters are battery powered. A shielded power/pulse output cable with DIN connection is included.

Features

- Simple and economical mechanical meter
- No moving parts for low maintenance and a long life
- Minimal straight pipe required
- Pulse output for loggers, PLC's, telemetry
- Solar power compatible

Applications

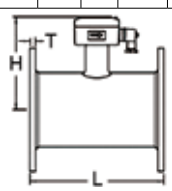


Ideal for municipal and industrial water, wastewater effluent, cooling tower water, well usage reporting, irrigation water, and more.

Specifications

Pipe Sizes (Inches)	4, 6, 8, 10
Flow Ranges (Inch)	4: 12 to 500 gpm 6: 32 to 1200 gpm 8: 60 to 2200 gpm 10: 95 to 3500 gpm
Flanges	AWWA 150 lb drilling
Pressure	150 psi working pressure
Temperature Range	10°F to 130°F (-12°C to 55°C)
Accuracy	±1% at 100% to 10% of reading ± 2% at 10% of reading to cut off
Materials	Body: Welded steel, epoxy powder coated Liner: HDPE Electronics Housing: Die cast aluminum, powder coated Electrodes: 316 stainless steel
Rate Display	6-digits in units of gpm (standard), mgd, liters/minute, cfm
Totalizer Display	8-digits in units of gallons x 1000, cu feet, cu meters, megaliters
Power	WMX101: 12 to 24 VDC, 30 mA WMX104: 2 lithium 3.6VD batteries, replaceable, 3yr life (inc.)
Output Signal	Current sinking pulse, opto-isolated, 24 VDC, 10 mA max
Empty Pipe Detection	Hardware/software, conductivity-based
Environmental	NEMA 4X standard (optional short-term immersible)

Meter Size (Inch)	L		H		T		Weight	
	in	mm	in	mm	in	mm	lbs	kg
4	9.84	250	7.4	188	0.625	15.9	21	9.5
6	11.81	300	8.5	216	0.688	17.5	36	16.3
8	13.78	352	9.5	241	0.688	17.5	50	22.7
10	17.72	450	10.4	264	0.688	17.5	75	34.1



Ordering & Options

Magnetic Flow Meters*

Order No.	Pipe Dia. (Inch)	Power
WMX101-400	4	External
WMX101-600	6	External
WMX101-800	8	External
WMX101-1000	10	External
WMX104-400	4	Battery
WMX104-600	6	Battery
WMX104-800	8	Battery
WMX104-1000	10	Battery

* Standard units are US gallons. Please specify other units when placing order: mgd, cfm, or lpm.

Options

Order No.	Description
FT420W	Pulse to 4-20 mA Output and Wall Mounted Display
AO55W	Blind 4-20 mA Converter

EX80-Series Insertion Magmeters

Fixed Depth Electromagnetic Insertion Flow Meters for Full Pipe Flows

Features

- Ideal for wastewater and turbid water applications
- Low flow performance and accuracy superior to any mechanical flow sensor
- Retainer clip automatically sets correct depth
- Meter extends into the pipe about 1/8 of the pipe diameter, minimizing potential for clogging with debris

Applications

Ideal for metering pipe flows, wastewater effluent, industrial water processing, and other difficult environments.

Specifications

Flow Range	0.2 to 20 ft/sec (.06 to 6.09 m/sec)
Accuracy	1% full scale
Output	Square wave pulse, opto isolated, 500 Hz @ 20 ft/sec
Bi-Directional	Direction output, opto isolated
Empty Pipe Detection	Flow defaults to zero
Maximum Pipe Pressure	200 psi (13.8 bar)
Maximum Temperature	PVC: 130°F (55°C) Stainless Steel: 200°F (93°C)
Minimum Conductivity	20 microsiemens/cm
Power	12 to 24 VDC, 250 mA minimum
Materials	Mechanical: 316 SS/PVC Electrodes: Hastelloy Electrode plate: PVDF Housing cast: Powder-coated aluminum O-rings: EPDM
Dimensions	4 inch square; 6 to 7 inch total length (10.2 cm square; 15.2 to 17.8 cm total length)
Weight	2 lbs (907g)

Description

The EX80-Series Insertion Magmeters have a low-flow performance and accuracy superior to any mechanical flow sensor. The meters have no moving parts, so they are highly suitable for corrosive environments and difficult applications such as those involving changing viscosities and pulsating flows. They are particularly well-suited for metering the output of air-driven diaphragm pumps.

Select EX81 units for pipe sizes from 1 to 4 inch, EX82 units for pipe sizes from 6 to 10 inch, and EX83 units for 12 inch pipes. Meters are available in PVC (EX81P and EX82P) and stainless steel (EX81S, EX82S, and EX83S) materials.

Versatile Output

Designed for modularity and versatility, the EX80-series meters have a current-sinking pulse output that you can integrate with an appropriate transmitter or indicator depending on your application. For a scaled pulse and 4-20 mA output display, you can use the FT420M meter mounted display or the FT420W wall mounted display. For a 4-20 mA analog output only, you can mount the AO55M blind 4-20 mA converter directly onto the meter. If you are using the EX80 meter with a programmable controller, the output signal can be fed directly with no other conditioning required.

Simple Installation Fittings

We offer a range of special installation fittings for the fixed depth meters that will automatically ensure correct depth placement in the pipe. Fittings are available in PVC, stainless steel, bronze and ductile iron.

Ordering & Options

Insertion Magmeters

Order No.	Material	Pipe Diameter
EX81P	PVC	1" to 4"
EX81S	Stainless Steel	1" to 4"
EX82P	PVC	6" to 10"
EX82S	Stainless Steel	6" to 10"
EX83S	Stainless Steel	12"

Installation Fittings for EX81

Order No.	Material	Fitting Type	Pipe Diameter (Inch)
EF81T-P-100	PVC	Tee	1
EF81T-P-150	PVC	Tee	1½
EF81T-P-200	PVC	Tee	2
EF82S-P-300-16[1,2]	PVC	Saddle	3
EF82S-P-400[2]	PVC	Saddle	4
EF81T-S-100	304 SS	Tee	1
EF81T-S-150	304 SS	Tee	1½
EF81T-S-200	304 SS	Tee	2
EF82S-B-300	Bronze	Saddle	3
EF82S-B-400	Bronze	Saddle	4
EF82W-S-400	316 SS	Weld	4

1) Installed on 16 inch long pipe stub.

2) PVC saddle is supplied with Buna-N O-rings only. For chemical service, the O-ring must be removed and the saddle glued on to the pipe with PVC cement.

Installation Fittings for EX82

Order No.	Material	Fitting Type	Pipe Diameter (Inch)
EF82S-P-600[2]	PVC	Saddle	6
EF82S-P-800[2]	PVC	Saddle	8
EF82S-F-600	Ductile Iron	Saddle	6
EF82S-F-800	Ductile Iron	Saddle	8
EF82S-F-1000	Ductile Iron	Saddle	10
EF82S-F-1200	Ductile Iron	Saddle	12
EF82W-S-600	316 SS	Weld	6
EF82W-S-800	316 SS	Weld	8
EF82W-S-1000	316 SS	Weld	10
EF82W-S-1200	316 SS	Weld	12

2) PVC saddle is supplied with Buna-N O-rings only. For chemical service, the O-ring must be removed and the saddle glued on to the pipe with PVC cement.

Optional Output Displays & Converters

Order No.	Description
FT420M	Pulse to 4-20 mA Output and Meter Display
FT420W	Pulse to 4-20 mA Output and Wall Mounted Display
AO55M	Blind 4-20 mA Converter
AO55W	Blind 4-20 mA Converter and Wall Mounted Display

EX100-200 Electromagnetic Flow Sensors

Adjustable Depth Electromagnetic Insertion Flow Sensors for Full Pipe Flows

Description

The EX100-200 Electromagnetic Flow Sensors are highly reliable adjustable depth insertion flow sensors. The meters have no moving parts, no rotors to stop turning in dirty water, and no bearings to wear out.

How it Works

The sensor produces a rapidly reversing magnetic field in the lower housing. As fluid moves through this field, a voltage is generated. This voltage is measured and translated into a frequency signal that is proportional to flow rate. This square wave signal can then be sent directly to a PLC or other control system, or it can be converted using optional output displays and converters. The EX115-215 Hot Tap meters incorporate an isolation valve and a longer tube, which allows these meters to be easily inserted into or removed from the pipe while it is under pressure.

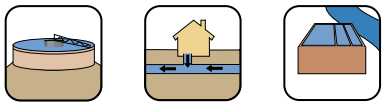
Versatile Output

Designed for modularity and versatility, the EX100-200 sensors have a current-sinking pulse output that you can integrate with an appropriate transmitter or indicator depending on your application. For a scaled pulse and 4-20 mA output display, you can use the FT420M meter mounted display or the FT420W wall mounted display. For a 4-20 mA analog output only, you can mount the AO55M blind 4-20 mA converter directly onto the meter. If you are using an EX100-200 meter with a programmable controller, the output signal can be fed directly with no other conditioning required.

Easy Installation

The installation fitting included with the EX100-200 sensors is standard male NPT, which can be directly threaded into ordinary saddles or threaded weld fittings.

Applications



Ideal for metering pipe flows, wastewater effluent, industrial water processing, and other difficult environments.

Specifications

Flow Range	0.2 to 20 ft/s (0.06 to 6.09 m/s)
Accuracy	1% full scale
Output	Square wave pulse, opto isolated, 500 Hz @ 20 ft/sec
Bi-Directional	Direction output, opto isolated
Empty Pipe Detection	Flow defaults to zero
Maximum Pipe Pressure	200 psi (13.8 bar)
Temperature	Ambient: 0° to 180°F (-17 to 82° C) Fluid: 32° to 212° F (0° to 100°C)
Minimum Conductivity	20 microsiemens/cm
Power	12 to 24 VDC, 250 mA
Installation Fitting	1-1/2 inch Male NPT
Materials	Mechanical: 316 SS/Brass Electrodes: Hastelloy Electrode plate: PVDF Housing Cast: Powder-coated aluminum O-rings: EPDM
Weight	EX101: 3 lbs (1.36 kg) EX201: 3.4 lbs (1.54 kg)
Dimensions	EX101: 4 inch square x 12 in long (10cm square x 30.5cm long) EX201: 4 inch square x 17 in long (10cm square x 43.2cm long)

Ordering & Options

Electromagnetic Flow Sensors

Order No.	Material	Pipe Dia. (Inch)
EX101B	Brass	3 to 10
EX101S	Stainless Steel	3 to 10
EX201B	Brass	10 to 48
EX201S	Stainless Steel	10 to 48

Hot Tap Electromagnetic Flow Sensors

Order No.	Material	Pipe Dia. (Inch)
EX115B	Brass Unit/Bronze Ball Valve	3 to 10
EX115S	316 SS Unit/Bronze Ball Valve	3 to 10
EX215B	Brass Unit/Bronze Ball Valve	10 to 48
EX215S	316 SS Unit/Bronze Ball Valve	10 to 48

Optional Output Displays & Converters

Order No.	Description
FT420M	Pulse to 4-20 mA Output, Meter Mounted Display
FT420W	Pulse to 4-20 mA Output, Wall Mounted Display
AO55M	Blind 4-20 mA Converter, Meter Mounted Display
AO55W	Blind 4-20 mA Converter, Wall Mounted Display

Features

- Ideal for turbid water applications
- Depth adjustable sensors
- EX101 fits any 1½ inch pipe fitting (standard saddle, for instance) and adjusts to pipe sizes 3-10 inch
- EX201 adjusts to pipe sizes 10 to 48 inch
- Meter extends into the pipe about 1/8 of the pipe diameter, minimizing potential for clogging with debris
- Optional 4-20 mA flow rate and totalizer display
- Alternatively, signal can be sent directly to a PLC or other controller
- Available in brass or 316 stainless steel

"When the well is dry, we learn the worth of water."

– Benjamin Franklin

You may also like . . .

GL500 Global Logger
Datalogger for recording flow sensor data. Includes powerful Global Logger software, weatherproof enclosure, and 12V battery.

Page 122

TX80-Series Turbine Insertion Flow Meters

Fixed Depth Turbine Insertion Flow Meters for Full Pipe Flows

Features

- Easy to install
- No spool pieces required
- High-quality ruby bearings for excellent low-flow performance and long life
- One easily replaced moving part
- Pickup exerts no magnetic drag on the rotor
- Square wave frequency output can connect directly to PLC's or counter controls
- Indicator or transmitter can be mounted on the flowmeter or remotely
- Fittings are available in a wide variety of materials and sizes

Specifications

Flow Range	0.2 to 30 ft/sec (0.06 to 9.14 m/sec)
Accuracy	±1% full scale
Sensor/Output	Hall Effect Sensor: 12 VDC current sinking pulse
Maximum Pipe Pressure	Polypro: 175 psi @ 75°F (12 bar @ 23.9°C) Brass: 200 psi (14 bar) 316 SS: 250 psi (17 bar)
Maximum Temperature	Polypro: 130°F (55°C) at 0 psi Brass, Stainless Steel: 200°F (93°C) at 0 psi
Nominal K-Factor	11 Hz/ft/sec (3.6 Hz/m/sec)
Power	6 to 24 VDC, 8 mA minimum
Materials	Sensor Body: Polypro, Brass, 316 stainless steel Rotor: Polypro Shaft: Nickel-bound tungsten carbide Bearings: Ruby Cable: #22 AWG 3-con 18' (6m)
Maximum Cable Run	2,000 ft (650m)
Weight	~2lbs (907g)
Dimensions	1-1/2" dia. x 4" long (3.8 cm dia. x 10 cm long)

Description

The TX80-Series Turbine Insertion Flow Meters are turbine-type insertion flow meters designed for use in pipes from 1½ to 8 inch in diameter. They are available in brass, 316 stainless steel, and polypropylene.

Precision Design

The TX80 meters have high quality jewel bearings and nickel bound tungsten carbide shafts that ensure maximum life and extreme low friction. The meter bodies are machined from solid rod for maximum precision and superior low flow performance. The precision design makes the meters ideal for chemical proportioning applications.

How it Works

The rotation of the meter's rotor is detected by a non-drag Hall effect sensor. The meter's output is a pulse-type square wave, which can be sent long distances (up to 2,000 feet) without a transmitter. This signal can be connected directly to PLC's, counters, and computer cards.

Versatile Output and Displays

For rate and total flow display, as well as pump pacing, you can mount the FT415M or FT420M flow indicator directly onto the sensor. For a wall-mounted display, select the FT420W. For a 4-20 mA analog output only, you can mount the optional AO55 blind 4-20 mA converter directly onto the meter.

Range of Installation Fittings

We offer a range of special installation fittings for the fixed depth meters that will automatically ensure correct depth placement in the pipe. Fittings are available in PVC, brass, and stainless steel.

Applications

Ideal for metering clean water flows and chemical proportioning.

Ordering & Options

Turbine Insertion Flow Meters

Order No.	Material	Pipe Dia. (Inch)
TX81Y	Polypro	1½ to 4
TX81B	Brass	1½ to 4
TX81S	Stainless Steel	1½ to 4
TX82Y	Polypro	6 to 8
TX82B	Brass	6 to 8
TX82S	Stainless Steel	6 to 8

Installation Fittings for TX81

Order No.	Material	Fitting Type	Pipe Dia. (Inch)
TF81T-P-150	PVC	Tee[1]	1½
TF81T-P-200	PVC	Tee[1]	2
MF82S-P-300-16[2 3]	PVC	Saddle	3
MF82S-P-400[3]	PVC	Saddle	4
TF81T-S-150	304 SS	Tee	1½
TF81T-S-200	304 SS	Tee	2
MF82S-B-300	Bronze	Saddle	3
MF82S-B-400	Bronze	Saddle	4
MF82W-S-400	316 SS	Weld	4

1) Male stub ends.

2) Installed on 16 inch long pipe stub.

Installation Fittings for TX82

Order No.	Material	Fitting	Pipe Dia. (Inch)
MF82S-P-600[3]	PVC	Saddle	6
MF82S-P-800[3]	PVC	Saddle	8
MF82S-F-600	Ductile Iron	Saddle	6
MF82S-F-800	Ductile Iron	Saddle	8
MF82W-S-600	316 SS	Weld	6
MF82W-S-800	316 SS	Weld	8

3) PVC saddle is supplied with Buna-N O-rings only. For chemical service, the O-ring must be removed and the saddle glued on to the pipe with PVC cement.

Optional Output Displays & Converters

Order No.	Description
FT415M	Battery Powered Pulse Output and Meter-Mounted Display
FT415W	Pulse to 4-20 mA Output and Wall-Mounted Display
FT420M	Pulse to 4-20 mA Output and Meter-Mounted Display
FT420W	Pulse to 4-20 mA Output and Wall-Mounted Display
AO55M	Blind 4-20 mA Converter, Meter Mounted
AO55W	Blind 4-20 mA Converter, Wall Mounted

TX100-200 Turbine Flow Sensors

Adjustable Depth Turbine Insertion Flow Sensors for Full Pipe Flows

Description

The TX100-200 Turbine Flow Sensors are highly reliable adjustable depth insertion turbine flow sensors. The sensors use ruby bearings and a non-drag pick off to achieve a wide flow range and a long life. A depth adjustment system allows two basic sizes to cover pipes from 3 to 48 inch in diameter.

How it Works

As fluid moves the TX100-200 turbine, a sensor detects the passage of miniature magnets in the rotor blades (magnets are in 2 or 4 blades only.) The resulting square wave signal can be sent over unshielded cable for hundreds of feet without a transmitter. This signal can be sent directly to a PLC or other controller, or it can be converted using a blind 4-20mA output or a flow rate and totalizer display. The TX115-215 Hot Tap meters incorporate an isolation valve and a longer tube, which allows these meters to be easily inserted into or removed from the pipe while it is under pressure.

Versatile Output and Displays

Designed for modularity and versatility, the TX100-200 sensors have a current-sinking pulse output that you can integrate with an appropriate transmitter or indicator depending on your application. For a battery powered pulse output, select the FT415M meter display or FT415W wall display. For a scaled pulse and 4-20 mA output display, you can use the FT420M meter display or the FT420W wall display. For a 4-20 mA analog output only, you can mount the AO55 blind 4-20 mA converter directly onto the meter. If you are using a TX100-200 sensor with a programmable controller, you can feed the output signal directly with no other conditioning required.

Easy Installation

The installation fitting included with the TX100-200 sensor is standard 1½ inch male NPT, which can be directly threaded into ordinary saddles or threaded weld fittings.

Specifications

Accuracy	±1% full scale
Flow Range	0.2 to 30 ft/sec (.06 to 9.14 m/sec)
Sensor/Output	Hall Effect Sensor: 12 VDC current sinking pulse
Maximum Pipe Pressure	200 psi (14 bar)
Maximum Temperature	200°F (93°C)
Pipe Size	TX101: 3 to 10 inch (50 to 250mm) TX201: 10 to 48 in (250 to 1200mm)
Fitting Size	1-1/2 inch NPT
Insertion Force	0.44 x pressure in pipe
Power	5 to 24 VDC, 1.5 mA
Materials	Sensor Body: Brass, 316 stainless steel Rotor: Polypro Shaft: Nickel-bound tungsten carbide Bearings: Ruby Cable: #22 AWG 3-con 18' (6m)
Maximum Cable	2,000 ft (650m)
Weight	TX101: 3 lbs (1.36 kg) TX201: 3.4 lbs (1.54 kg)
Dimensions	TX101: 4 inch square x 12 inch long (10cm square x 30.5cm long) TX201: 4 inch square x 17 inch long (10cm square x 43.2cm long) TX115: 15-3/4 inch (40 cm) tall w/ 2 inch male NPT TX215: 21-3/4 inch (55 cm) tall w/ 2 inch male NPT

Ordering & Options

Adjustable Depth Turbine Flow Sensors

Order No.	Material	Pipe Dia. (Inch)
TX101B	Brass	3 to 10
TX101S	Stainless Steel	3 to 10
TX201B	Brass	10 to 48
TX201S	Stainless Steel	10 to 48

Hot Tap Adjustable Depth Turbine Meters

Order No.	Material	Pipe Dia. (In)
TX115B	Brass Unit/Bronze Ball Valve	3 to 10
TX115S	316 SS Unit/Bronze Ball Valve	3 to 10
TX215B	Brass Unit/Bronze Ball Valve	10 to 48
TX215S	316 SS Unit/Bronze Ball Valve	10 to 48

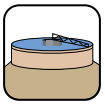
Optional Output Displays & Converters

Order No.	Description
FT415M	Battery Powered Pulse Output and Meter-Mounted Display
FT415W	Battery Powered Pulse Output and Wall-Mounted Display
FT420M	Pulse to 4-20 mA Output and Meter-Mounted Display
FT420W	Pulse to 4-20 mA Output and Wall-Mounted Display
AO55M	Blind 4-20 mA Converter Meter-Mounted Display
AO55W	Blind 4-20mA Converter Wall-Mounted Display

Features

- Easy installation through 1.5 inch NPT
- Two sizes fit entire pipe range: 3 to 10 inch and 10 to 48 inch
- Turbine rotor to optimize minimum flow limits
- High quality ruby bearings for long life
- One easily-replaced moving part
- Uses standard NPT threaded pipe fittings or saddles
- Optional 4-20 mA flow rate and totalizer display
- Signal can be sent directly to controller

Applications



Ideal for metering clean water flows and chemical proportioning.

"Water links us to our neighbor in a way more profound and complex than any other."

– John Thorson, *Indian Water Rights*

You may also like . . .

GL500 Global Logger
Datalogger for recording flow sensor data. Includes powerful Global Logger software, weatherproof enclosure, and 12V battery.
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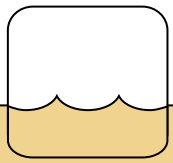


Pipe Layouts for Flow Meters

Most flow meters must be installed in locations where there is a significant run of straight pipe both upstream and downstream. The straight pipe smooths out turbulence produced by the presence of valves, thermowells, chemical injectors/diffusers, and changes in pipe direction. This type of turbulence produces errors in flow meter readings, ranging from about 10% in the case of an upstream thermowell to over 50% in the case of an upstream valve.

In order to achieve proper accuracy, we recommend that you install your flow meter in a location where there are a minimum of 10 diameters of straight pipe run upstream and 5 diameters of straight pipe run downstream. Under specific circumstances, you may need much more straight run prior to the flow meter.

If you cannot provide enough run to smooth out the turbulence caused by valves, fittings, and changes in direction, you will have to live with the inaccurate effects this turbulence will create for your flow meters. However, this does not mean that the flow meter's readings are meaningless. In the majority of applications, the flow meter is suitable for providing repeatable readings, if not accurate ones. In applications where the flow meter is a control device (such as operating a valve or controlling a chemical addition) repeatability of the reading is more critical than absolute accuracy. You may find that you can get excellent results without excellent accuracy.

FIND OUT MORE AT WWW.GLOBALW.COM

SPX Inline Low Flow Meter

Chemical-Resistant Low Flow Meter for Small Pipes

Features

- Accurate at lower flow rates
- Resistant to many low-corrosive chemical solutions
- Pulse output is compatible with most PLC's and controllers
- Transparent housing for sight flow inspection
- Replaceable non-wetted solid-state pickup
- Thread sizes from 3/8 to 1 inch NPT

Description

The SPX Inline Low Flow Meter is a chemical-resistant meter designed for measuring flows in small pipes. The SPX is available in standard pipe thread sizes from 3/8 to 1 inch NPT. A transparent acrylic cover provides visual flow indication for the meter's PVDF rotor element. The 6-24 VDC pulse output is compatible with many different types of PLCs, counters, and a full range of rate displays and controls.

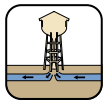
The SPX employs ruby bearings and a nickel tungsten carbide shaft to measure very low minimum flows and provide superior wear characteristics. The meter's polypropylene body is resistant to many mild chemicals. The meter's rotor is PVDF, and the nickel-bonded tungsten carbide shaft is similar to stainless steel in resistance. If you are using wetted materials that are questionable, please contact Global Water for assistance.

The meter can be installed vertically or horizontally. Please note that a straight pipe run of at least 5 diameters (10 diameters is preferred) upstream of the meter is recommended.

Specifications

Flow Rates	3/8 inch: 0.07 to 5 gpm 1/2 inch: 0.1 to 10 gpm 3/4 inch: 0.2 to 20 gpm 1 inch: 0.5 to 40 gpm
Accuracy	±1% full scale
Maximum Pressure	150 psi (10 bar)
Maximum Temperature	160°F (70°C)
Power	6 to 24 VDC, 2 mA minimum
Sensor Cable	18 ft AWG 22 3-conductor
Maximum Cable Run	2000 ft (650 m)
Materials	Body: Polypropylene Cover: Acrylic Rotor: PVDF Shaft: Nickel tungsten carbide Bearings: Ruby
Size	4.1 x 2.2 x 2.1 inch (10.5 x 5.5 x 5 cm)
Weight	2.5 lbs (1.13 kg)

Applications



Ideal for weak chemical flows, small diameter pipes, and low flows.

Ordering & Options

SPX Inline Low Flow Meters

Order No.	Thread Size (Inch) (NPT)	Cable Length
SPX-038	3/8	18 ft
SPX-050	1/2	18 ft
SPX-075	3/4	18 ft
SPX-100	1	18 ft

Optional Output Displays & Converters

Order No.	Description
FT415W*	Battery Powered Pulse Output and Display
FT420W	Pulse to 4-20 mA Output and Display
AO55W	Blind 4-20 mA Converter

*NOTE: The FT415W requires the SPX to be fitted with a micropower option. Please ensure that this option is noted when you order your flow meter.

Micro-Flo Paddlewheel Flowmeter

Digital Flowmeter for Very Low Flows

Description

The Micro-Flo Paddlewheel Flowmeter is designed to measure very low flows down to 1 oz./min, in tubing sizes down to 1/8 inch. The Micro-Flo's chemical resistant wetted materials make it suitable for many chemical feed applications. (More chemical feed products are presented starting on page 96.)

Easy Digital Display and Calibration

The Micro-Flo's easy to read, 6-digit LCD display indicates both rate and total accumulated flow, with user selectable or custom programmable scale factors in units of US gallons, liters, ounces, and milliliters. Time units are selectable in minutes, hours, or days. The Micro-Flo meter also features a volumetric field calibration programming system, which allows the user to fine tune the meter for a particular application. A handy open collector alarm output is included for use with an autodialer, PLC, or telemetry system.

Rugged Design

The Micro-Flo's rugged sensor body is constructed of chemical-resistant PVDF and includes a clear PVC window so that you can observe the liquid flow past the impeller.

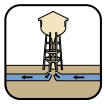
Options to Meet Your Needs

The Micro-Flo models listed below are offered with 1/8 inch NPT(F) or 3/8 inch OD connections, a sensor-mounted display, and a 115 VAC to 15 VDC power supply. Additional process connections are available by special order— please contact Global Water regarding this option.

Features

- No external power required
- Quick and easy to install
- LCD rate and totalizer display
- No programming required
- Measure very low flows (to 1 oz./min)

Applications



Ideal for low flow and small pipe diameter flow metering applications.

Specifications

Accuracy	±6% full scale
Materials	Body, Paddle, Axle: PVDF NPT (F) Connection: PVC Tubing Connectors: PVDF
Maximum Working Pressure	PVC lens: 130 psig (9 bar) @ 70°F (21°C) PVDF lens: 150 psig (10 bar) @ 70°F (21°C)
Maximum Fluid Temperature	PVC Lens, F/NPT Connectors: 130°F (54°C) @ 0 psi PVDF Lens, tubing connectors: 200°F (93°C) @ 0 psi

Input Power	9 to 28 VDC
Sensor Type	Infra-red light beam
Sensor Output Cable	3-wire shielded cable, 6 ft
Enclosure	Valox® PBT, NEMA type 4X (IP56)
Shipping Weight (Approximate)	1 lb (0.45 kg)
Dimensions	5 x 3.5 x 2.22 inch (127 x 89 x 56.26 mm)

Ordering & Options

Order No.	Flow Range (oz./min)	Flow Range (ml/min)	Connection (Inch)
FS1-100-5V	1 to 10	30 to 300	1/8 NPT(F)
FS1-200-5V	3.5 to 35	100 to 1,000	1/8 NPT(F)
FS1-300-5V	7 to 70	200 to 2,000	1/8 NPT(F)
FS1-400-5V	10 to 100	300 to 3,000	1/8 NPT(F)
FS1-500-5V	17 to 170	500 to 5,000	1/8 NPT(F)
FS1-600-5V	24 to 240	700 to 7,000	1/8 NPT(F)
FS1-100-6V	1 to 10	30 to 300	3/8 OD Tubing
FS1-200-6V	3.5 to 35	100 to 1,000	3/8 OD Tubing
FS1-300-6V	7 to 70	200 to 2,000	3/8 OD Tubing
FS1-400-6V	10 to 100	300 to 3,000	3/8 OD Tubing
FS1-500-6V	17 to 170	500 to 5,000	3/8 OD Tubing
FS1-600-6V	24 to 240	700 to 7,000	3/8 OD Tubing

Micro-Flo Installation Notes

When installing your Micro-Flo meter, please note the following installation tips:

1. The meter can be mounted on horizontal or vertical runs of pipe. The paddle axle must remain horizontal ±10°.
2. The meter can accurately measure flow from either direction.
3. The meter can only be used with fluids that can pass infrared light.
4. The meter is designed to withstand outdoor conditions. We recommend you install it in a cool, dry location where it can be easily accessed.
5. The unit's LCD is not recommended for direct sunlight applications.

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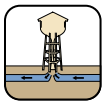
F-1000 Series Flowmeters

Saddle or T-Mount Paddlewheel Meters for Full-Pipe Flows

Features

- No external power required
- Quick and easy to install
- LCD rate and totalizer display
- No programming required
- Battery powered
- Rugged design

Applications



Ideal for full pipe water flow metering in pipes sizes from 3/8 to 2 inch, including in mildly corrosive liquids.

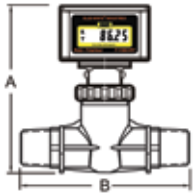
Specifications

Accuracy	±2% full scale
Display	6-digit LCD, rate and total
Maximum Pressure	300 psig (20.7 bar) @ 70°F (20.7°C)
Maximum Fluid Temperature @ 0 psi	T-mount: 200°F (93°C) Saddle-mount: 140°F (60°C)
Materials	Sensor body/paddle/axle: PVDF Mounting T: Polypropylene Mounting saddle: 1-1/2 to 3 inch: PVDF, 6 to 10 inch: PVC O-Rings: Viton®
Power	Two AAA batteries (included)
Battery Life	1-year minimum
Enclosure	NEMA 4X, ABS
Dimensions	See illustrations
Weight	2 lbs (907 kg)

T-Mount Dimensions

Pipe Size	A	B
3/8 MPT	5-3/8	4-3/4
1/2 MPT	5-3/8	5-1/8
3/4 MPT	5-3/8	5-1/4
1 MPT	5-3/8	5-5/8
1-1/2 MPT	6-1/8	6-1/2
2 MPT	6-1/8	6-3/4

All dimensions in inches.



Description

The DIGI-FLOW™ F-1000 paddlewheel meters are easy to install, battery-powered, and a great value for many full pipe water flow applications. The F-1000 features high quality, durable materials that provide for a long operational life in a variety of applications, including mildly corrosive liquids. With simple strap-on saddle or T-mount installation fittings, you can install the F-1000 quickly on most standard pipe sizes and mount it in virtually any position. The easy to read, 6-digit LCD display indicates both rate of flow and total flow, and includes a reset button for the totalizer. Once the F-1000 is installed, its meter head and mechanical portion may be quickly removed for maintenance or replacement.

Options to Meet Your Needs

The T-mount F-1000 meters are available in sizes from 3/8 to 2 inch and come with standard male pipe threads. The saddle-mount version fits any pipe with a wall thickness equal to schedule 40 or schedule 80 pipe, with model diameters from 1½ to 6 inch.

Easy Installation

You can quickly and easily install a meter by simply drilling a 1-1/8 inch hole in the pipe and strapping the unit on with the included hardware. Each F-1000 is pre-calibrated for a specific pipe size and wall thickness, so it is ready to install right out of the box. All necessary mounting hardware and batteries are included.

Additional Notes

In addition to the gpm units presented below, F-1000 Models are available in lpm and metric pipe sizes– please contact us regarding availability. Remember to always check for chemical compatibility before using this or any other flowmeter with a liquid other than clean to slightly turbid water.

Ordering & Options

T-Mount Models

Order No.	Pipe Size (Inch)	Flow Range (gpm)
RT-375MI-GPM1	3/8	0.8 to 8
RT-375MI-GPM2	3/8	0.4 to 4
RT-500MI-GPM1	½	2 to 20
RT-500MI-GPM2	½	0.5 to 5
RT-750MI-GPM1	¾	3 to 30
RT-750MI-GPM2	¾	0.8 to 8
RT-100MI-GPM1	1	5 to 50
RT-100MI-GPM2	1	2 to 20
RT-150MI-GPM1	1½	4 to 40
RT-150MI-GPM2	1½	6 to 60
RT-150MI-GPM3	1½	10 to 100
RT-200MI-GPM1	2	4 to 40
RT-200MI-GPM2	2	6 to 60
RT-200MI-GPM3	2	10 to 100
RT-200MI-GPM4	2	20 to 200

Saddle Mount Models - Schedule 40 Pipe Walls

Order No.	Pipe Size (Inch)	Flow Range (gpm)
RT-150S4-GPM1	1½	15 to 150
RT-200S4-GPM1	2	30 to 300
RT-300S4-GPM1	3	60 to 600
RT-400S4-GPM1	4	100 to 1000
RT-600S4-GPM1	6	250 to 2500
RT-800S4-GPM1	8	400 to 4000
RT-1000S4-GPM1	10	600 to 6000
RT-1200S4-GPM1	12	800 to 8000

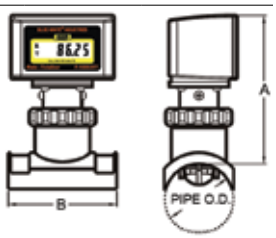
Saddle Mount Models - Schedule 80 Pipe Walls

Order No.	Pipe Size (Inch)	Flow Range (gpm)
RT-150S8-GPM1	1½	15 to 150
RT-200S8-GPM1	2	30 to 300
RT-300S8-GPM1	3	60 to 600
RT-400S8-GPM1	4	100 to 1000
RT-600S8-GPM1	6	250 to 2500
RT-800S8-GPM1	8	400 to 4000
RT-1000S8-GPM1	10	600 to 6000
RT-1200S8GPM1	12	800 to 8000

Saddle Dimensions

Pipe Size in (mm)	A (Inch)	B (Inch)
1.5 (050)	4-5/16	3-3/16
2 (063)	4-5/16	3-3/16
3 (090)	4-5/16	3-3/16
4 (110)	4-5/16	3-3/16

Pipe Size in (mm)	A (Inch)	B (Inch)
6 (160)	4-1/4	3-3/16
8 (200)	4-1/4	3-3/16
10 (250)	4-1/4	4-1/2
12 (315)	4-1/4	4-1/2



FM500 Ultrasonic Flow Meters

Ultrasonic flow meters that use transit time and Doppler methods to measure flow

Features

- Clean or dirty water applications with selectable modes
- Quick and easy setup and operation
- Clamp-on transducers never contact process liquid
- Built in data logger downloads to standard SD card
- Fully configurable analog and pulse outputs

Description

The Global Water FM500 ultrasonic flow meters provide accurate and trouble free flow metering for a wide range full pipe applications including: potable water, raw wastewater, effluent, well water, slurries, or virtually any sound conducting liquid. The FM500 incorporates the latest ultrasonic technology to give you an accurate, easy to use hybrid flow meter with selectable Doppler or transit-time operating modes. With its quick and easy clamp-on transducer installation, factory pre-configuration and user programmable menu driven interface, the meter is a snap to commission in the field. The reliable ultrasonic flow meters use custom algorithms and DSP technology to ensure high accuracy flow metering, and the proprietary AGC (Automatic Gain Control) algorithm eliminates the need for manual gain adjustments.

Loaded with the features, the FM500 includes: five programmable and password protected configurations for multiple user and portable applications, an easy to read 320 x 240 pixel backlit LCD display, data logging to standard SD Card format (user configurable to time interval, flow rate and total set-point triggers), isolated 4-20mA analog and 0-1000Hz pulse outputs.

Optional features include: three configurable relay outputs and a communications package that allows the meter to connect to your computer via RS-232, RS-485, USB or Ethernet. The communication package also permits remote access and control of all functions including real-time display, system configuration, data logging, remote data capture and process control functions. The software included with the meter's communication package allows remote internet access through a local network set-up.

Specifications

Liquid velocity range	0 to 30 f/s (0 to 9 m/s)
Measuring principle	Ultrasonic Doppler or transit time via pipe mounted transducers
Accuracy at pipe inside diameter	Flow rate averaging time (5.0s): +1% of rate >8 ft/s and +0.06 ft/s <8 ft/s (Transit time 1/2" to 1") +1% of rate >1 ft/s and +0.01 ft/s <1 ft/s (Transit time 1-1/4" to 12") Flow rate averaging time (1.0s): +1% of rate >12 ft/s and +0.12 ft/s <12 ft/s (Transit time 1/2" to 1") +1% of rate >5 ft/s and +0.05 ft/s <5 ft/s (Transit time 1-1/4" to 12") Flow rate averaging time (0.5s): +2% of rate >12 ft/s and +0.25 ft/s <12 ft/s (Transit time 1/2" to 1") +2% of rate >12 ft/s and +0.25 ft/s <12 ft/s (Transit time 1-1/4" to 12")
Condition of flow	Full pipe within the minimum and maximum velocity specifications
Liquid types	Virtually any acoustically conductive fluid
Transit time mode	from 0% to 1% (0 to 10,000 ppm) particulate
Nominal pipe sizes	1/2 - 12 inch (20 to 315 mm)
Pipe materials	Most metal and plastic pipes
Pipe liner materials	Most plastic liners
Enclosure	NEMA 4X (IP66), powder coated aluminum, stainless steel hardware
Mounting	Wall, pipe (vertical or horizontal) or panel Hardware included
Panel opening	10.63x8.10 inches (270x206 mm) (HxW)
Panel depth	2.78 inches (71 mm), front: 2.18 inches (55 mm)
Operating temp	14 to 140° F (-10 to 60° C)
Storage temp	-40 to 158° F (-40 to 70° C)
Dimensions	11.0x8.6x5.0 inches (279x218x127 mm) (HxWxD)
Weight	6.8 lb. (3.1 kg)

Clamp-On Transducers

Housing	NEMA 4X (IP66), powder coated aluminum, stainless steel hardware
Cable	Shielded coaxial RG/U 59, PVC jacket, RoHS Compliant. Standard length: 10 ft. (3m)
Nominal Pipe Sizes	A series: 1/2 - 2.0 inch (20 - 63 mm) B series: 2.0 - 12.0 inch (63 - 300mm)
Dimensions	3.12x2.95x1.60 inches (79x75x41 mm) (HxWxD)
Weight	0.8 lb. (0.4 kg.) each

Ordering & Options

FM500

Order No.	Description
FM500	Ultrasonic Flow Meter
FM500-B	3-relay option (for control and alarms)
FM500-A	Smart communications/ configuration package
FM500-50	50 FT transducer cable (for 2 transducers)

NOTE: Optional transducer cable lengths available, 25 ft. (7m), 50 ft. (15m), and 100 ft. (30m)

"Filthy water cannot be washed."

– African proverb

F-400N Series Flowmeters

Variable Area Inline Flowmeters

Description

The F-400N Series Variable Area Flowmeters, including the F-400N and F-410N versions, have long been two of the most popular lines. These flowmeters feature superior styling and quality materials. They are also available in a variety of models to suit the needs of your specific applications.

Quality Features

The F-400N Series flowmeters are machined of highest quality acrylic that is polished to a crystal clear finish. Additional design features include corrosion and wear resistant internal parts, sturdy well-built adapters, Viton® o-ring seals, and PVC or stainless steel floats.

Easy Reading

Permanent scales are screen printed onto the meter body directly in front of the float for easy reading. The F-400's also include back reflectors for easy reading.

Various Models

As shown in the Ordering & Options section below, F-400N Series flowmeters are available for a variety of flow rates; with 1/4, 3/8, or 1/2" F/NPT adapters; and with components in a variety of materials. In addition to the versions presented below, other configurations and flow ranges are available. Please contact us with your desired mounting configuration, liquid being measured, and measurement range in gpm, lpm or cfm.

Features

- Tough machined acrylic meter body
- Direct reading permanent scale
- Acceptable in direct sunlight applications
- Reinforced connections with metal thread supports

Applications

Ideal for water treatment systems, reverse osmosis systems, manufacturing and management of deionized water, and more.

Specifications

Max. Working Pressure	150 psi (10.3 bar) @ 70°F (21°C)
Max. Fluid Temperature	Polypropylene adapters: 150°F (65°C) @ 0 psi PVC adapters and floats: 120°F (49°C) @ 0 psi
Full Scale Accuracy	± 5%
Calibration Fluid	Water, specific gravity 1.0
Maximum Pressure Drop	2 psi
Dimensions	F-400N: 8-3/16 inch H x 1-1/4 inch dia. (21cm H x 3.2cm dia.) F-410N: 11 inch H x 1-3/4 inch dia. (28cm H x 4.5cm dia.)
Weight	F-400N: 0.5 lb. (.23 kg) F-410N: 2.0 lb. (.91 kg)

Ordering & Options

F-400N Standard Models for Liquid

Order No.	Flow Range (gpm)	Flow Range (lpm)	F/NPT Adapter (Inch)	Connector	Float
F-40250LN-4	0.025 to 0.250	0.1 to 1.0	1/4"	PVC	PVC
F-40050LN-4	0.050 to 0.500	0.2 to 2.0	1/4"	PVC	316 SS
F-40375LN-8	0.1 to 1.0	0.4 to 4.0	1/2"	Polypropylene	PVC
F-40376LN-8	0.2 to 2.0	1.0 to 7.5	1/2"	Polypropylene	316 SS
F-40377LN-8	0.3 to 3.0	1.5 to 11.0	1/2"	Polypropylene	316 SS
F-40500LN-8	0.5 to 5.0	2.0 to 20.0	1/2"	Polypropylene	316 SS

F-410N Standard Models for Liquid

Order No.	Flow Range (gpm)	Flow Range (lpm)	F/NPT Adapter (Inch)	Connector	Float
F-40750LN-12	1.0 to 10	4 to 38	3/4	Polypropylene	316 SS
F-41017LN-12	1.0 to 17	4 to 64	3/4	Polypropylene	316 SS
F-41000LN-12	2.0 to 20	8 to 80	3/4	Polypropylene	316 SS
F-41000LN-16	2.0 to 20	8 to 80	1	Polypropylene	316 SS

"Rain is a blessing when it falls gently on parched fields, turning the earth green, causing the birds to sing."

– Donald Worster, *Meeting the Expectations of the Land*

F-550 Series Flowmeters

Variable Area Flowmeters for Flush Panel Mounting

Description

The F-550 Series Panel Mount Flowmeters are used widely to monitor and control flows in a variety of water and mild chemical applications. Designed for easy flush panel mounting, the F-550 meters come with polypropylene back connectors in standard NPT sizes, with the bulkhead nuts included. The rugged F-550 meters are made from one-piece machined and polished acrylic with 316 stainless steel floats for accuracy and long life. A precisely calibrated dual flow scale (gpm and lpm) is permanently printed on the meter body for clear and accurate readings.

Choose from a standard unit or an adjustable unit with a built-in rate valve for precise flow control.

Features

- One piece machined and polished acrylic meter body
- Annealed for added strength and chemical resistance
- Flush mount design includes bulkhead nuts
- Monitor and control flows in a variety of applications
- Accurate and rugged design
- Dual flow scale (gpm and lpm)

Specifications

Accuracy	±5% full scale
Materials	Float: 316 stainless steel Body: Acrylic Adapter Polypropylene O-ring: Viton®
Mounting	Panel mount
Mounting Hole Diameter	11/16 inch
Maximum Fluid Temperature	200°F (93°C) @ 0 pressure

Applications

Ideal for water treatment systems, reverse osmosis systems, manufacturing and management of deionized water, and more.

Maximum Pressure	250 psig (17.2 bar) @ 70°F (21°C)
Maximum Pressure Drop	2 psi
Weight	2 lbs (907 kg)
Dimensions	7-1/4 x 1-1/16 x 1-1/4 inch (184 x 27 x 32 mm)

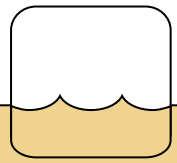
Ordering & Options

Standard Models

Order No.	Flow Range (gpm)	Flow Range (lpm)	Connection (Inch)
F-55250L	0.025 to 0.25	0.1 to 1	1/4 NPT (M)
F-55375L	0.1 to 1	0.4 to 4	3/8 NPT (M)
F-55376L	0.2 to 2	0.75 to 7.5	3/8 NPT (M)
F-55500L	0.5 to 5	2 to 20	1/2 NPT (M)
F-55010L	1 to 10	4 to 40	1 NPT (M)
F-55200L	2 to 20	7.5 to 75	1 NPT (M)

Adjustable Models with Rate Valve

Order No.	Flow Range (gpm)	Flow Range (lpm)	Connection (Inch)
F-55250LA	0.025 to 0.25	0.1 to 1	1/4 NPT (M)
F-55375LA	0.1 to 1	0.4 to 4	3/8 NPT (M)
F-55376LA	0.2 to 2	0.75 to 7.5	3/8 NPT (M)
F-55500LA	0.5 to 5	2 to 20	1/2 NPT (M)
F-55010LA	1 to 10	4 to 40	1 NPT (M)
F-55200LA	2 to 20	7.5 to 75	1 NPT (M)



Variable Area Flow Metering

A variable area flowmeter includes a vertically tapered tube through which fluid passes, from the smaller end up to the larger. As fluid flows through the tube, it forces an indicator (a float) upward. The clearance space (area) between the float and tube increases as the float approaches the top of the meter. This increasing area requires a larger amount of fluid to force the float higher. By varying the taper of the tube, the mass of the float, and the length of the tube, different flow ranges can be calibrated.

A variable area flowmeter must be plumbed into a piping system with the narrow part of the taper at the bottom. The tube usually includes a scale of flow increments. The flow rate can be read by matching the increments on the tube with the float. There are four common types of floats, which should be read in specific ways to ensure accurate measurements. In addition, when disassembling flowmeters for cleaning, the floats "up" position should be noted. While our variable area flowmeters are clearly marked, indicating how they should be read, the following can be used as an additional reference:

- Sharp Edge and Ball Floats: Sharp edge floats include a single wide ridge, and ball floats are widest around their circumference. These types of floats should be read at their largest diameters.
- Hat and Slug Floats: These floats both have flat tops and tapered bottoms. The hat float also has a recognizable raised band around its upper diameter. These floats should be read at their tops.

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RF-Series Ramp Flumes

Fixed Size Flumes for Flow Measurement

Features

- Low investment for accurate water measurement
- Wide flow rate ranges available
- Easy to install
- Self cleaning approach section
- Flumes with flow rates up to 10 cfs can be shipped via UPS

Applications

Ideal for small streams, irrigation ditches, and lined or unlined canals.

"Solid stone is just sand and water . . . Sand and water and a million years gone by."

– Beth Nielsen Chapman, Singer/Songwriter

You may also like . . .

Set up a Stream Gauging Station
Find out more about how to set up a stream gauging station using Global Water's Flow Probe and the WL16 Water Level Logger.
Page 2

FP111-211 Flow Probes
Handheld digital water velocity meter for quick and easy streamflow measurements.
Page 22

FC200 Open Channel Flow Monitor
Meter for measuring and totalizing flows for all flumes and weirs.
Page 26

Description

Global Water's RF-Series Ramp Flumes are low cost flumes built for easy installation and high accuracy.

Rugged Design

The Ramp Flumes are built from high grade 16 gauge galvanized steel and will resist most corrosive environments. The design utilizes rigid flanges and bracing to allow the use of soil as a backfill during installation.

Easy Shipping

The flumes are shipped unassembled to minimize cost of freight. The RF3.5, RF7, and RF10 units (with maximum flow rates from 3.5 to 10 cubic feet per second) can be shipped by UPS.

Simple Installation

Installation of a Ramp Flume is simple and straightforward. The flume can be transported to the installation site by hand, horse, truck, or ATV. The large ramp flumes are heavy and will require excavation equipment for lifting and site preparation. However, surveying and complicated excavation are not required, so the cost of installation will be minimal. When installing, simply ensure that the flume is level from end to end and side to side. Only a nut wrench and screw driver are necessary for assembly, but gloves should be used for safety during installation.

High Accuracy and Low Maintenance

Extensive testing and evaluation under field and laboratory conditions have shown that the RF-Series Ramp Flumes consistently achieve accuracy to within 3% when properly installed. The increased flow velocity in the throat section discourages sediment accumulation in this part of the flume. The approach section near the gauge has a self-cleaning function that provides long intervals for debris-free operation and consistent accuracy. This allows for long periods of operation between cleanings and maintenance.

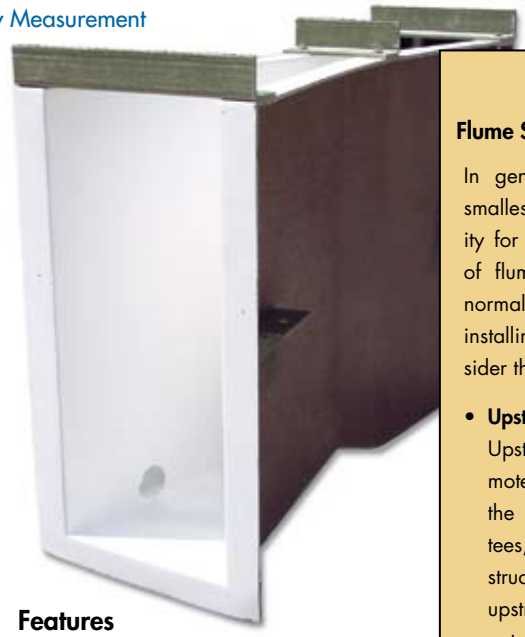
Ordering & Options*

Order No.	Flow Range (cfs)	Flow Range (gpm)	Constructed Size (Inch) (LxHxW)	Shipping Weight
RF3.5	0.1 to 3.5	45 to 1,571	47-1/2x14-7/8x12-1/4	62 lbs (28 kg)
RF7	0.1 to 7.0	45 to 3,142	47-1/2x14-7/8x24-1/4	86 lbs (39 kg)
RF10	0.1 to 10.0	45 to 4,488	47-1/2x14-7/8x36-1/4	108 lbs (48 kg)
RF20	0.5 to 20.0	224 to 8,976	80x28x34-1/8	400 lbs (181 kg)

* Choosing the correct flume size is important. We suggest using the smallest size that will accommodate your channel's flow. Please contact Global Water regarding your selection.

Parshall, Palmer Bowlus, and "H" Flumes

Primary Devices for Open Channel Flow Measurement



Description

Global Water's Parshall, Palmer Bowlus, and "H" Flumes are constructed of high quality polyester resin and fiberglass. These flumes are durable, highly accurate, and easy to install.

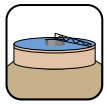
These primary device flumes constrict an open channel's flow either horizontally, vertically, or both horizontally and vertically. Once the flow is backed up behind the flume's constriction, there is a defined relationship between the upstream water level and the open channel flow through the constriction. This relationship can be determined either by an equation or a look-up table.

Global Water's three standard molded flumes include:

- The *Parshall* flume, which constricts primarily horizontally, and is design for rectangular or trapezoidal channels.
- The *Palmer-Bowlus*, which constricts the flow vertically and horizontally and can be molded to be inserted into an existing half-round pipe.
- *"H" flumes*, which attach to the ends of pipes where the water is free-falling.

Diagrams of these flumes, dimensions, and flow data are available on Global Water's website at www.globalw.com.

Applications



Parshall Flume: Ideal for rectangular channels, including many irrigation, environmental, and industrial channels.

Palmer Bowlus: Ideal for monitoring sewer flow, effluent, influent, and other flows in round channels such as pipes.

"H" Flume: Ideal for measuring runoff from small agricultural wetlands, feedlots, infiltration areas, as well as flows in streams and sewage systems.

Features

- High quality polyester resin and fiberglass materials
- Highly durable and accurate
- Easy to install

Ordering & Options

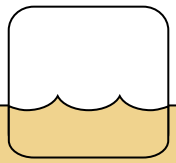
Flumes*

Order No.	Flume Type	Size (Inch)
01-006	Parshall	1 Width
01-007	Parshall	2 W
01-008	Parshall	3 W
01-009	Parshall	6 W
01-010	Parshall	9 W
01-011	Parshall	12 W
01-014	Palmer-Bowlus	4 Dia.
01-015	Palmer-Bowlus	6 D
01-016	Palmer-Bowlus	8 D
01-017	Palmer-Bowlus	10 D
01-018	Palmer-Bowlus	12 D
01-027	"H"	0.5 H
01-028	"H"	0.75 H
01-029	"H"	1.0 H

* Larger sizes are available, please call for more information. Please contact Global Water regarding your selection. Diagrams and dimension/flow data for all flumes are at www.globalw.com.

Accessories

Order No.	Description
Flume-SW8	Attached 8 inch Stilling Well
Flume-SWP2	2 inch Stilling Well Port
Flume-SW2	2 inch Stilling Well
Flume-SG	Staff Gauge
Flume-BT	Bubbler Tube
Flume-WW	Wingwalls (pair)
Flume-CAC	Concrete Anchor Clips



Flume Selection and Installation Tips

In general, you should select the smallest flume of adequate capacity for your application. The sizing of flumes is based on anticipated normal and maximum flows. Before installing your flume, you should consider the following attributes:

- **Upstream Conditions and Effects:** Upstream conditions should promote laminar flow conditions at the flume inlet. Channel turns, tees, elevation drops, or other obstructions should be avoided. The upstream channel slope should not allow excessive velocity at the flume. A slope of almost flat to 3% maximum is ideal for very small flumes, and 2% maximum is ideal for larger flumes. A 1:4 sloping ramp upstream should be provided for flumes that must be installed above the channel floor. Since a flume will restrict your channel, you should also consider the influence that backwater may have on upstream drains and channel walls.
- **Crest of the Flume:** The crest of the flume (the floor of the converging section where depth measurements are made) must be level both longitudinally and transversely.
- **Downstream Channel:** The downstream channel should not permit submerged flow conditions to occur. Long, narrow, flat, or undersized channels can result in a backwater effect at the flume and should be avoided. A large fall or steep slope immediately downstream of the metering station can eliminate the possibility of submerged flow conditions.

FIND OUT MORE AT WWW.GLOBALW.COM