

# Simple, Non-Contacting Flow Meter

## for Accurate Flow Measurement from Outside a Pipe

***New!***

### Doppler Flow Meter Model DFM 5.1

**Displays, Transmits,  
Totalizes and Controls**

User-Friendly Calibration  
Password Protected  
Isolated 4-20mA Output  
2 Control Relays  
Digital Signal Processing  
Optional Intrinsic Safety

**Ideal for “Problem Liquids”**

**External Sensor  
No Contact, No Maintenance**

***GREYLINE***  
***instruments inc.***



### **Non-Contacting Flow Monitoring and Control Ultrasonic Sensor mounts on any Pipe**

Greyline Doppler Flow Meters monitor the flow rate of dirty or aerated liquids including: wastewater, chemicals, acids, slurries, abrasives and viscous liquids. Recommended for full pipes and any fluid that contains solids or bubbles.

The DFM 5.1 strap-on sensor is mounted on the outside of a plastic or metal pipe ½ inch / 12.7 mm diameter or larger. To measure flow an acoustic signal is reflected back to the sensor from moving particles or gas bubbles suspended in the fluid.

Installation is easy - without shutting down the flow system. No contact is made with the moving fluid and no pipe cutting or drilling is required. There is no fouling or scale build-up on the sensor.

The DFM 5.1 Doppler Flow Meter includes an ultrasonic sensor, a simple 5-key calibration system, a large digital flow rate display with totalizer, isolated 4-20mA output and two programmable control relays. Data logger and intrinsically safe sensor are optional.

# Non-Contacting Doppler Flow Meter Measures Flow with Strap-On Ultrasonic Sensor

## Designed for “difficult” liquids

The DFM 5.1 Doppler flow meter works best in applications that would defeat regular contacting flow meters. Because the Sensor is mounted on the outside of the pipe, it is unaffected by abrasives or harsh chemicals. There is no obstruction to flow and no pressure drop.



### Easy to Install

Each DFM 5.1 Doppler Flow Meter includes a strap-on ultrasonic sensor, an adjustable stainless steel mounting clamp and sensor coupling compound. The sensor fits on the outside of any pipe diameter ½" (12.7 mm) or larger. It takes just a few minutes to install. There is no need to shut down flow.

### Simple, Single-Head Sensor design

Ultrasonic signals are transmitted and received from a single-head sensor. The mounting clamp (included) ensures correct sensor alignment on horizontal or vertical pipes. The DFM 5.1 automatically self-tunes to the cable length up to 500 ft. (152 m).

### Works on most Pipes

The Greyline DFM 5.1 Flow Meter measures flow in PVC, carbon steel, stainless steel, cast iron, fiberglass, and lined pipes... any pipe material that conducts ultrasound. Doppler signals cannot transmit through pipe walls which contain air pockets (e.g. concrete or wood), or loose pipe liners (with an air gap between the liner and pipe wall).

## NEW - Backlit Matrix Display with Simple, 5-key Menu System

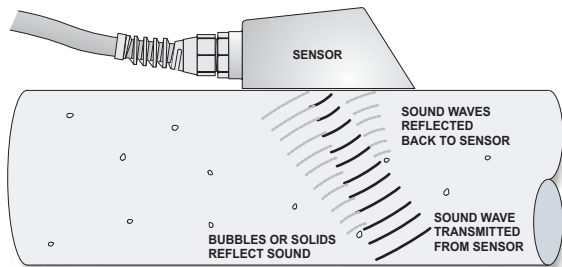
Calibration is easy with the new DFM 5.1 user-friendly menu system. Press the arrow keys to scroll through menus, change settings and enter calibration values. You can select English, French or Spanish menus, enable a password to protect settings and control brightness of the digital display.

## NEW - Reverse Flow Measurement

The DFM 5.1 measures flow in either direction and displays positive or negative values. You can control the Totalizer to subtract reverse flow, or to totalize forward flow only. The 4mA setting can also be adjusted to a negative flow setting.

## NEW - Optional Data Logger with USB Thumb Drive Support

Order your DFM 5.1 Doppler Flow Meter with an optional built-in 2 million point data logger. It includes Windows software to display flow charts and tables, and to create dynamic flow reports. Just plug in a standard USB flash drive and log files are downloaded automatically - and fast!



## Principle of Operation

The DFM 5.1 Sensor transmits continuous high frequency sound through the pipe wall into the flowing liquid.

Sound is reflected back to the Sensor from particles or gas bubbles in the liquid. If the liquid is flowing, the reflected sound returns at an altered frequency (the Doppler effect). The DFM 5.1 continuously measures this frequency shift to accurately measure flow.

## New Enhanced Signal Processing for Reliable Accuracy

The DFM 5.1 Doppler flow algorithm filters out background noise and interference. The high speed digital signal processor discriminates against weak and distorted signals for increased reliability and accuracy. If the processor cannot measure accurately the meter will display zero flow.

# DFM 5.1 Doppler Flow Meter Specifications

**Specifications:**

- Flow Rate Range:**  $\pm 0.1$  to 40 ft/sec ( $\pm 0.03$  to 12.2 m/sec) in most applications
- Pipe Size:** Any pipe ID from  $\frac{1}{2}$ " to 180" (12.7 mm to 4.5 m)
- Accuracy:**  $\pm 2\%$  of reading or 0.05 ft/sec (0.015 m/sec). Requires solids or bubbles minimum size of 100 microns, minimum concentration 75 ppm. Repeatability:  $\pm 0.1\%$ , Linearity  $\pm 0.5\%$
- Display:** White, backlit matrix - displays flow rate, relay states, 16-digit totalizer, operating mode and calibration menu
- Calibration:** built-in 5-key calibrator with English, French or Spanish language selection
- Power Input:** 100-240VAC 50-60Hz (see Options), 5 Watts maximum (with standard features)
- Output:** Isolated 4-20mA (1000 ohm load max.)
- Control Relays:** Qty 2, rated 5 amp SPDT, programmable flow alarm and/or proportional pulse
- Enclosure:** watertight, dust tight NEMA4X (IP 66) polyester with a clear polycarbonate face
- Electronics Operating Temperature:**  $-10^{\circ}$  to  $140^{\circ}$ F ( $-23^{\circ}$  to  $60^{\circ}$ C)
- Sensitivity:** adjustable. Damping: adjustable
- Electrical Surge Protection:** Sensor, 4-20mA output and AC power input
- Shipping Weight:** 14 lbs (6.3 kg)

**Sensor:**

- Model SE4** single-head ultrasonic with 20 ft (6 m) shielded cable and stainless steel mounting kit for pipes  $\frac{1}{2}$ " (12.7 mm) ID or larger. Designed to withstand accidental submersion to 10 psi. Certified non-incendive for Class I Division 2, Groups A,B,C,D hazardous locations
- Sensor Operating Temperature:**  $-40^{\circ}$  to  $300^{\circ}$ F ( $-40^{\circ}$  to  $150^{\circ}$ C)

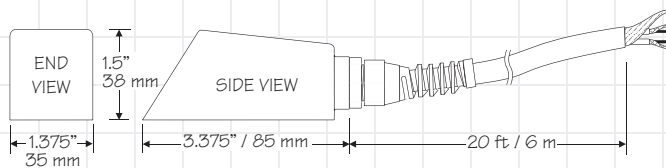
**Options:**

- Sensors:** Intrinsic Safety Barriers for Sensor mounting in Class 1 Div.1 hazardous locations
- Sensor Cable:** 50 ft. (15 m) or 100 ft. (30 m) continuous shielded coaxial pair, or splice up to 500 ft (152 m) with Junction Box. Self tunes to extended cable
- Enclosure Heater:** for outdoor installation, 16 watt thermostatically controlled to  $-40^{\circ}$ F ( $-40^{\circ}$ C)
- Data Logger:** Built-in 2 million point logger with USB output and Windows™ software
- Power input:** 9-32VDC
- Control Relays:** 4 additional (6 total) rated 5 ampere SPDT

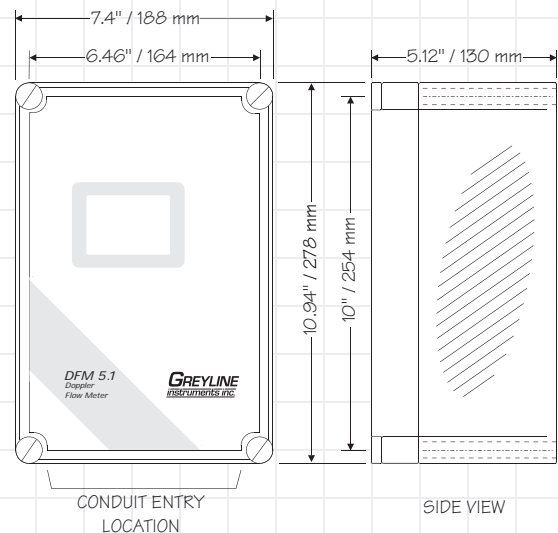
**Applications:**

- Recommended for:** liquids containing suspended solids or bubbles minimum size of 100 microns, minimum concentration 75 ppm. Sensor mounts on Vertical or Horizontal pipes
- Sensor Mounting Location:** 6-10 pipe diameters from elbows, tees (turbulence increasing devices) and  $>30$  pipe diameters from pumps, controlling valves and pipe discharge
- Pipe Materials:** steel, stainless steel, cast iron, PVC, fiberglass, any contiguous pipe material that conducts sound, including lined pipes with liner bonded to pipe wall. Avoid pipes with loose insertion liners and pipe walls which contain air (concrete, wood etc.)

## Dimensions



SE4 ULTRASONIC  
DOPPLER SENSOR



ENCLOSURE

# Non-Contacting Doppler Flow Meter

## Monitors, Displays, Totalizes and Controls from Outside a Pipe

### Designed for:

- ✓ Raw Sewage
- ✓ Treated wastewater
- ✓ Viscous liquids
- ✓ Chemicals and Acids
- ✓ Sludge and Slurries
- ✓ Solvents
- ✓ Pulp stock
- ✓ Food products
- ✓ Lubricating Oils
- ✓ Crude Oil
- ✓ Cooling Water

**Ideal for full pipes and any liquid containing gas bubbles or solids larger than 100 microns and in concentrations greater than 75 ppm.**



### Greyline DFM 5.1 Doppler Flow Meter

The DFM 5.1 flow sensor installs *without cutting the pipe*. It takes just a few minutes to mount on the *outside* of any pipe. Calibration is easy with the built-in, 5-button keypad. Select your choice of flow units and enter pipe diameter through the user-friendly calibration menu. Enable password protection to prevent tampering.

### Special Features

- Digital processing system tracks flow signals accurately and auto-zeroes with signal loss
- Noise suppression circuitry filters “dirty” power and electrical interference from most VFD’s
- Automatically converts between measurement units (e.g. gallons or liters)
- Calibration data and Totalizer values are stored automatically during power interruptions
- Output “simulation” function simplifies calibration of remote devices (e.g. chart recorders or controllers)
- Self-tunes to Sensor cable length

### Benefits of Non-Contacting Flow Measurement

No Contact means no maintenance, no sensor fouling, no obstruction to flow, no pressure drop, no corrosion and no pipe cutting or drilling for installation.

### How to Order

Contact a Greyline sales representative in your area or phone one of our sales engineers. Describe your requirements and receive our prompt quotation.

### Applications Support

Take advantage of Greyline's applications experience. Phone toll free 1-888-473-9546 for advice and information on applications, installation or service for Greyline instruments.

### No Risk Appraisal

The Greyline DFM 5.1 Doppler Flow Meter must meet your requirements. Discuss your application with a Greyline representative to arrange a 30-day trial.

### The Greyline Guarantee

Quality of Materials and Workmanship - Each instrument manufactured by Greyline is warranted against defects in materials and workmanship for a period of one year from date of purchase. Refer to our limited warranty included with each product.

**GREYLINE**  
**instruments inc.**

Canada: 16456 Sixsmith Dr., Long Sault, Ont. K0C 1P0  
Tel: 613-938-8956 / 888-473-9546 Fax: 613-938-4857  
USA: 105 Water Street, Massena NY 13662  
Tel: 315-788-9500 / 888-473-9546 Fax: 315-764-0419  
Internet: [www.greyline.com](http://www.greyline.com) E-mail: [info@greyline.com](mailto:info@greyline.com)

RELIABLE MEASUREMENT AND CONTROL