

# Simple, Non-Contacting Flow Meter for Accurate Flow Measurement from Outside a Pipe

***New!***

## Doppler Flow Meter Model DFM 4.0

**Displays, Transmits,  
Totalizes and Controls**

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



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

**Ideal for “Problem Liquids”**

**External Sensor  
No Contact, No Maintenance**

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 4.0 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 4.0 Doppler Flow Meter includes an ultrasonic sensor, a simple 3-key calibration system, a large digital flow rate display, totalizer, isolated 4-20mA output and three 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 4.0 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 4.0 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.

## Works on most Pipes

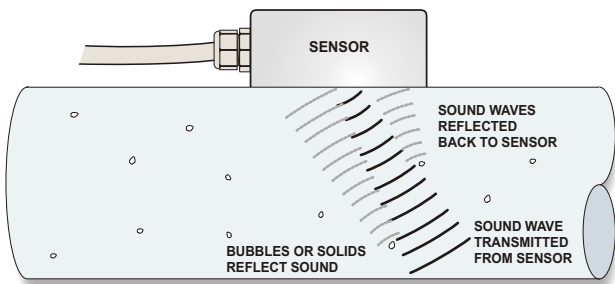
The Greyline DFM 4.0 Flow Meter measures flow in most pipe materials: PVC, carbon steel, stainless steel, cast iron, fiberglass, and lined pipes... any pipe material that conducts ultrasound. Doppler signals cannot transmit through pipe walls which contain air pockets (e.g. concrete or wood), or loose pipe liners (with an air gap between the liner and pipe wall). Because the sensor is so easy to install you can test any application and pipe material in a few minutes.

## Simple, Single-Head Sensor design

Ultrasonic signals are transmitted and received from a single sensor so installation is easy. The mounting clamp (included) ensures correct sensor alignment on horizontal or vertical pipes.



**DFM 4.0  
Sensor  
and  
Mounting  
Clamp**



## Principle of Operation

The DFM 4.0 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 4.0 continuously measures this frequency shift to accurately measure flow.

## Self-tunes to extended Sensor Cable length

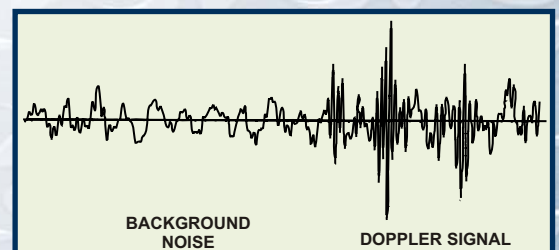
Each Sensor includes 20 ft. (6 m), shielded coaxial cable. Cable can be extended up to 500 ft. (152 m) with no loss of signal strength or performance. The DFM 4.0 automatically self-tunes to the cable length.

## Intrinsically Safe Sensor for Hazardous locations

DFM 4.0 Sensors are CSA rated for installation in hazardous locations with optional intrinsic safety barriers. Safety barriers are factory-installed in the electronics enclosure so all sensor cable and any junction boxes are intrinsically safe. Electronics are normally mounted in a non-rated general purpose location, or they can be factory-installed in an optional explosion proof enclosure for mounting in hazardous-rated areas.

## New Signal Processing for reliable Accuracy

The DFM 4.0 Doppler flow algorithm filters out background noise and interference. The digital signal processor discriminates against weak and distorted signals. When the processor cannot measure accurately the meter will display zero flow and indicate low signal confidence.





# DFM 4.0 Doppler Flow Meter Specifications

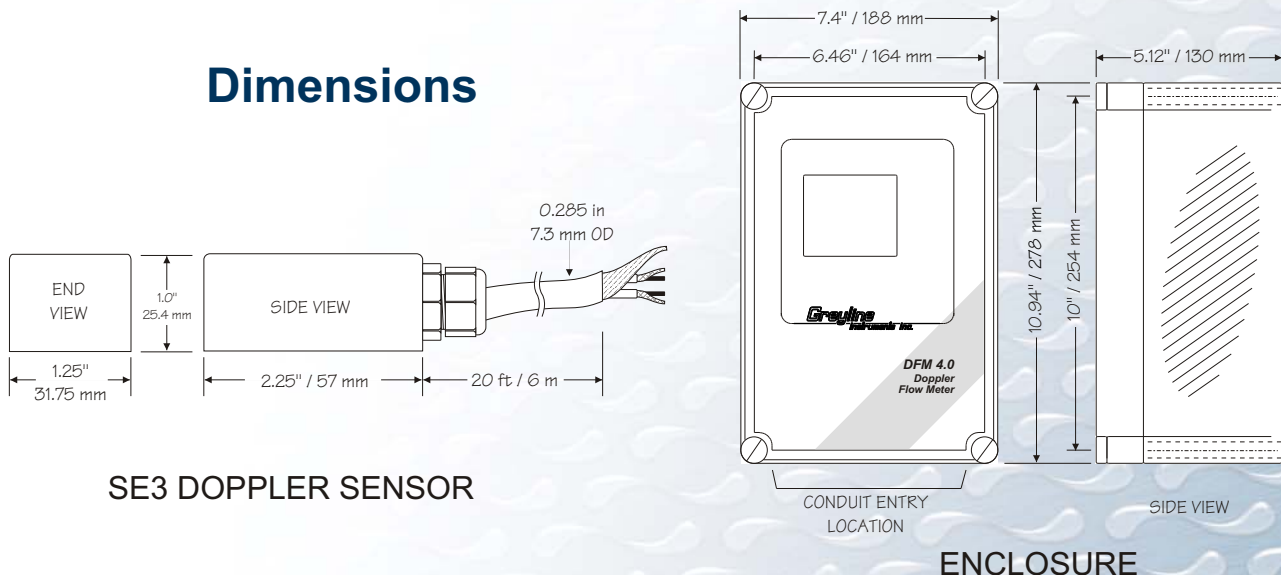
**Specifications:** Flow Rate Range: 0.25 to 40 ft/sec (0.08 to 12.2 m/sec) in most applications  
Pipe Size: Any pipe ID from ½" to 180" (12.7 mm to 4.5 m)  
Accuracy: ±2% of full scale. Requires solids or bubbles minimum size of 100 microns, minimum concentration 75 ppm. Repeatability: ±0.1%, Linearity ±0.5% of full scale  
Displays: Flow Rate - large, 4-digit LCD in programmable engineering units  
Totalizer/Menu/Status/Signal Strength - 16-digit LCD, alphanumeric  
Calibration: built-in 3-key calibrator, No-drift transmitter: quartz crystal frequency reference  
Power Input: 100-130VAC 50-60Hz (see Options), 5 watts maximum  
Output: Isolated 4-20mA (1000 ohm load max.)  
Control Relays: Qty 3, rated 5 amp SPDT, programmable flow alarm and/or proportional pulse  
Back Flow Rejection: forces display and outputs to zero with contact closure from remote relay  
Enclosure: watertight, dust tight NEMA4X (IP 66) fiberglass with a clear shatter-proof face  
Electronics Operating Temperature: -10° to 140°F (-23° to 60°C)  
Sensitivity: adjustable. Damping: adjustable  
Electrical Surge Protection: Sensor, 4-20mA output and AC power input  
Shipping Weight: 12 lbs (5 kg)

**Sensor:** Model SE3 single-head ultrasonic with 20 ft (6 m) shielded cable and stainless steel mounting kit for pipes ½" (12.7 mm) ID or larger. Designed to withstand accidental submersion to 10 psi (non-functional while submerged). Sensor Operating Temperature: -40° to 200°F (-40° to 93°C)

**Options:** Sensors: Intrinsic Safety Barriers for Sensor mounting in hazardous locations, SE3H High Temperature model rated up to 302°F (150°C), ISE Insertion type for special applications  
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°F (-40°C)  
Data Logger: Built-in 50,000 point logger with RS232 output and Windows™ software  
Power input: 200-260VAC 50-60HZ, or 9-36VDC

**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)  
>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



# 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 4.0 Doppler Flow Meter

The DFM 4.0 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, 3-button keypad. Select your choice of flow units and enter pipe diameter through the plain-English 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.

