

# TTFM 6.1 TRANSIT TIME FLOW METER



## THE RIGHT METER FOR

Treated Water  
Raw Water  
Cooling Water  
Low-Conductivity Water  
Water/Glycol Solutions  
Hydraulic Oil  
Diesel & Fuel Oils  
Chemicals

## Features

- 1/2" through 48" pipe range
- Simple 5-key Configuration
- 4-20mA/0-5V Output
- 26 Million Point Data Logger
- Backlit LCD Display
- Password Protected
- Modbus<sup>®</sup> RTU or HART Optional

## Accurate Flow Measurement of Clean Liquids with Non-Contacting Transducers

### Non-Contacting Flow Measurement

Ultrasonic transducers mount on the outside of pipes to measure flow rate of clean, non-aerated fluids like water, chemicals, and oils. The clamp-on transducers can be mounted without system shutdown. There is no pressure drop and no obstruction.

### User-Friendly Operating System

Use the built-in keypad for fast and easy programming with menu selection of pipe diameter, pipe material, liquid type, and measurement units (gallons, liters, etc.). Settings, calibration values, and totalizer are retained during power interruptions.

### Industrial Automation Protocols

Instantaneous flow rate, volume total, run hours, and diagnostic information are just some of the information available via optional Modbus RTU or HART communications.

### Wide Range of Applications

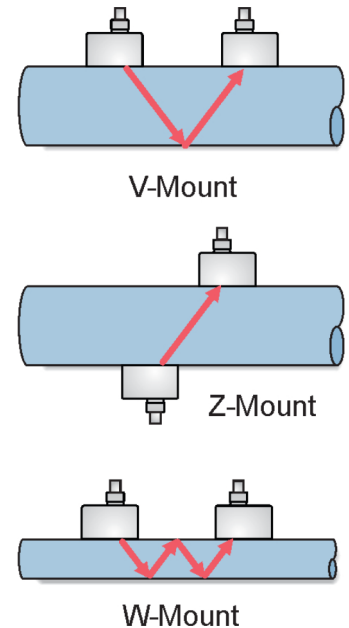
Powerful new signal processing and multiple transducer options allow the TTFM 6.1 to be used accurately and without setup hassle on a wide range of pipe materials and applications.

## Measures Flow from the Outside of Pipes

The TTFM 6.1 Transit Time Flow Meter works by measuring the time of flight difference for ultrasonic sound pulses transmitted from one transducer to another. Depending on the mounting configuration, the signal may cross the pipe once, twice, or four times. The time between transmitted and received signals is precisely measured by the flow meter. Ultrasonic signals are sent upstream and then downstream with the transducers alternating their functions as transmitters/receivers.

The transit time in the direction of flow is always faster than the transit time against the flow. By comparing these differences with precision timing circuits, the TTFM 6.1 is able to accurately calculate the flow rate. Because the ultrasonic signal is transmitted across the pipe, an average of the flow profile is calculated.

TTFM 6.1 transducers can be mounted on vertical or horizontal pipes, and the pipe must be full. Choice of V, Z, or W mounting method depends on the application and pipe diameter.



## Simple Menu System for Fast and Easy Start-up

Start-up can be done in a few minutes. Use the built-in, 5-button keypad to enter the pipe material, OD, wall thickness, and fluid type. The TTFM 6.1 will display the correct transducer separation distance and mounting method. Secure the stainless steel pipe clamps and align the mounting brackets on the outside of the pipe. Put coupling compound (included) on the transducer faces and insert them into the mounting brackets. The TTFM 6.1 will immediately begin to display, transmit, and totalize flow.



## Works from the Outside of Common Pipe Materials

Mount the TTFM 6.1 ultrasonic transducers on the outside of many pipes including carbon steel, stainless steel, ductile iron, concrete lined ductile iron, cast iron, PVC, HDPE, PVDF, copper, brass, aluminum, and pipes with bonded liners including epoxy, rubber, and Teflon®. Avoid pipes made with porous materials (e.g. wood or concrete) or with loose insertion liners.

## Works with Clean Liquids

The TTFM 6.1 Transit Time Flow Meter is designed for flow measurement of fairly clean, non-aerated liquids in full pipes. High concentrations of solids or gas bubbles (>2% by volume) will attenuate sound and the Transit Time ultrasonic signal may not be able to cross the pipe. A Greyline DFM6.1 Doppler Flow Meter is recommended for applications with solids or bubbles (e.g. wastewater or slurries).

## Transducer Installation in Wet Locations

The TTFM 6.1 Transit Time Flow Meter transducers are rated IP67 for accidental submersion. The flow meter will continue to operate and measure flow accurately during temporary periods of submergence.

## TTFM 6.1 Advanced Features

Optional Modbus® RTU via RS-485 serial or HART communication provides multiple data points on a single twisted-pair connection. Data includes, but is not limited to, flow rate, flow total, diagnostic information, and the ability to reset volume totals from the Modbus® connection. BAUD rate, network address, parity, and number of stop bits for Modbus® communications are easily programmed and changed via the 5-button keypad.

The TTFM features advanced diagnostics like signal strength, measured fluid sonic velocity, and indication of transducer integrity.



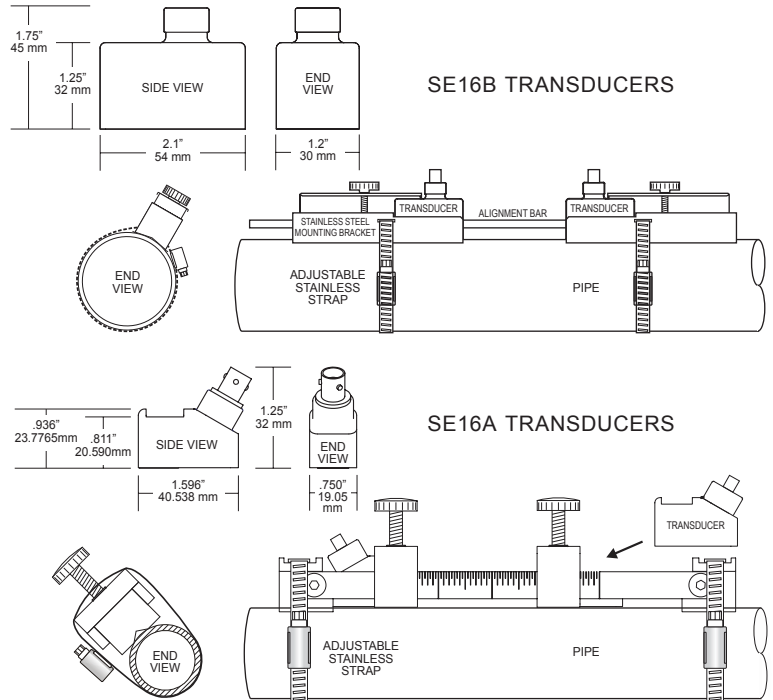
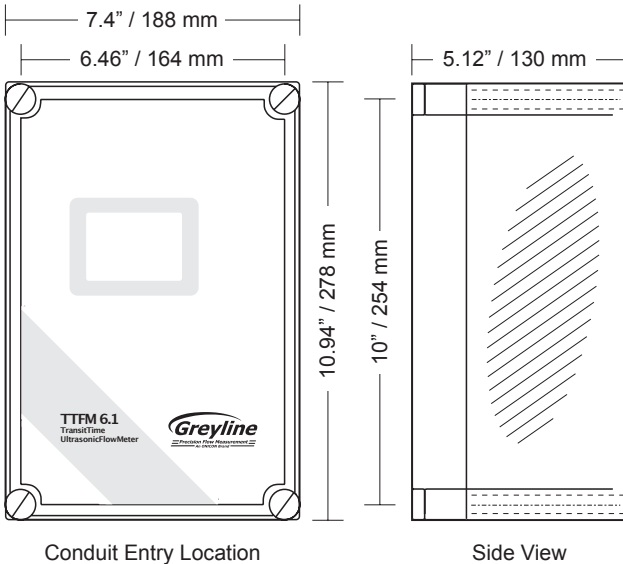
## Greyline TTFM 6.1 Ultrasonic Transit Time Flow Meter Specifications

GENERAL SPECIFICATIONS	
<b>Operating Parameters</b>	For clean liquids in full pipes with less than 2% solids or gas bubbles
<b>Programming</b>	Built-in, 5-button keypad with English, French, and Spanish menu language selection
<b>Electronics Enclosure</b>	Watertight and dust tight NEMA4X (IP 66) polycarbonate with clear, shatterproof cover
<b>Accuracy</b>	±1% of reading from 1.5 to 40 ft/sec (0.5 to 12.0 m/sec) and ±0.015 ft/sec (±0.0046 m/sec) for velocity below 1.5 ft/sec (0.46 m/sec). Repeatability & Linearity: ±0.25%
<b>Display</b>	White, backlit matrix – displays 5-digit flow rate with floating decimal, 14-digit totalizer, relay status, operating mode and calibration menu
<b>Power Input</b>	<ul style="list-style-type: none"> <li>100–240VAC 50–60Hz, 10 VA maximum</li> <li>Optional: 9–32VDC, 10 Watts maximum</li> </ul>
<b>Analog Output</b>	Isolated 4–20mA/ 0–5V, 1000 ohm load maximum, programmable offset
<b>Control Relays</b>	<ul style="list-style-type: none"> <li>2 Relays, form 'C' dry contacts rated 5 amp SPDT; programmable flow alarm and/or flow proportional pulse</li> <li>Optional: 4 additional (6 total), rated 5 amp SPDT</li> </ul>
<b>Data Logger</b>	Built-in 128MB data logger with USB output and Windows® software. Capacity for approx. 26 million data points
<b>Operating Temp. (Electronics)</b>	–5° to 140°F (–20° to 60°C)
<b>Approximate Shipping Weight</b>	12 lbs. (5.5 kg)
<b>Approvals</b>	CE, CSA/UL/EN 61010-1

TRANSDUCER SPECIFICATIONS	
<b>Pipe Diameter</b>	SE16B – 2" to 48" (50 mm to 1200 mm) SE16A – 0.5" to 4" (15 mm to 100 mm)
<b>Flow Velocity Range</b>	±0.07 to 40 ft/sec (±0.02 to 12 m/sec)
<b>Pipe Materials</b>	Any metal or plastic sonic conducting material including carbon steel, stainless steel, ductile iron, concrete lined ductile iron, cast iron, PVC, HDPE, PVDF, fiberglass, copper, brass, aluminum, and pipes with bonded liners including epoxy, rubber, and Teflon®
<b>Operating Freq.</b>	SE16B – 1.28 MHz SE16A – 2.56 MHz
<b>Operating Temp.</b>	–40° to 300°F (–40° to 150°C)
<b>Transducer Mounting Kit</b>	SE16B – Includes set of stainless steel pipe clamps, alignment bar, and coupling compound. SE16A – Includes stainless steel track with pipe clamps and built-in ruler and coupling compound.
<b>Transducer Cables</b>	Triaxial, 25 ft (7.6 m) with BNC connectors and seal jackets (extendable up to 500 ft / 150 m)
<b>Hazardous Locations</b>	<ul style="list-style-type: none"> <li>Non-incendive for Class 1 Div 2, Groups A,B,C,D</li> <li>Optional: Intrinsically safe for Class 1 Div 1, Groups A,B,C,D</li> </ul>
POPULAR OPTIONS	
<b>Industrial Automation Protocols</b>	Modbus® RTU via RS-485 or HART (field selectable)
<b>Transducer Cables</b>	<ul style="list-style-type: none"> <li>50 ft (15 m) triaxial with BNC connectors and seal jackets</li> <li>100 ft (30 m) triaxial with BNC connectors and seal jackets</li> </ul>
<b>Enclosure Heater</b>	Thermostatically controlled to –40°F/C–recommended for temperatures below 32°F (0°C)
<b>Sunscreen</b>	Enclosure sunscreen for outdoor installations

The TTFM 6.1 Transit Time Flow Meter is ideal to measure flow rate of clean, non-aerated fluids in full pipes.

**Dimensions**



**How to Order**

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

**Applications Support**

Take advantage of Greyline's applications experience. Call 1-888-473-9546 for advice and information on applications, installation, or service for Greyline Instruments.

**No-Risk Appraisal**

The Greyline TTFM 6.1 Transit Time 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.



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