



Greyline

TTFM 6.1

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

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, with no pressure drop and no obstruction to flow.

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.). In the event of a power outage or disruption, the Greyline TTFM 6.1 is able to retain settings, calibration values, and totalizer readings with its on-board memory.

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.



THE RIGHT METER FOR

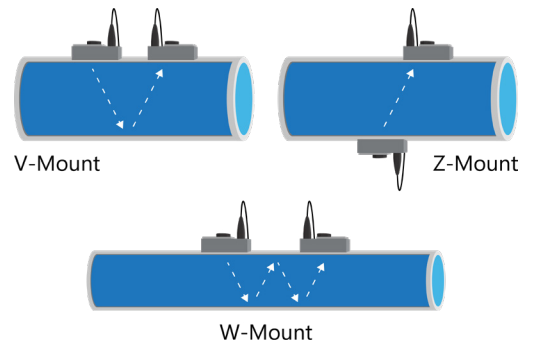
- Treated Water
- Raw Water
- Cooling Water
- Chemicals
- Hydraulic Oil
- Low-Conductivity Water
- Water / Glycol Solutions
- Diesel & Fuel Oils

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 can 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. The choice of V, Z, or W mounting method depends on the application and pipe diameter.



Simple Menu System for Fast & Easy Start-Up

Start-up can be done in a few minutes, using the built-in 5-button keypad to enter the pipe material, outer diameter, 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 the 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 DFM 6.1 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 sensors are rated IP67 for accidental submergence, the accompanying flow meter will continue to operate and measure flow accurately during temporary periods of submergence.



TTFM 6.1 Advanced Features

Optional Modbus RTU via RS485 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 RTU connection. BAUD rate, network address, parity, and the number of stop bits for Modbus RTU 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.

Technical Specifications

GENERAL SPECIFICATIONS

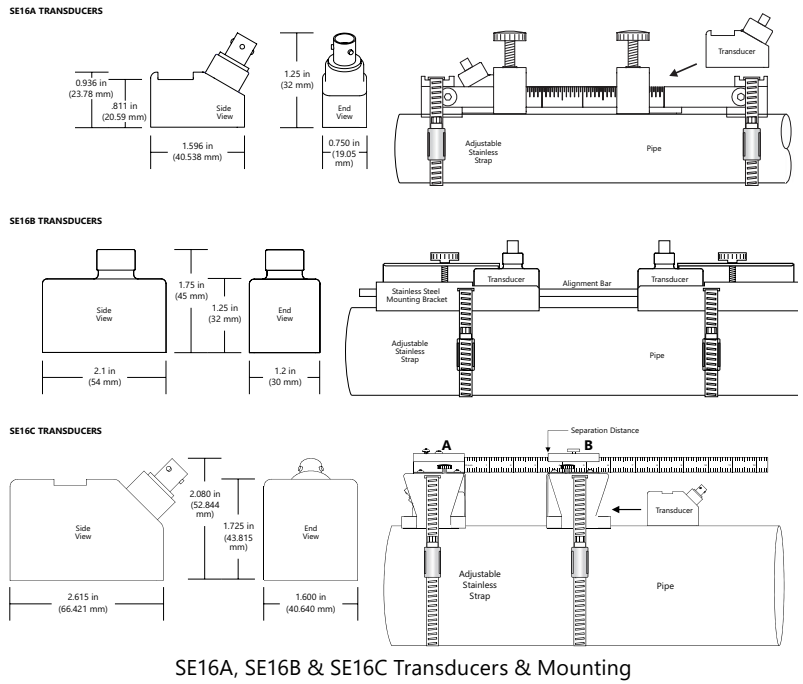
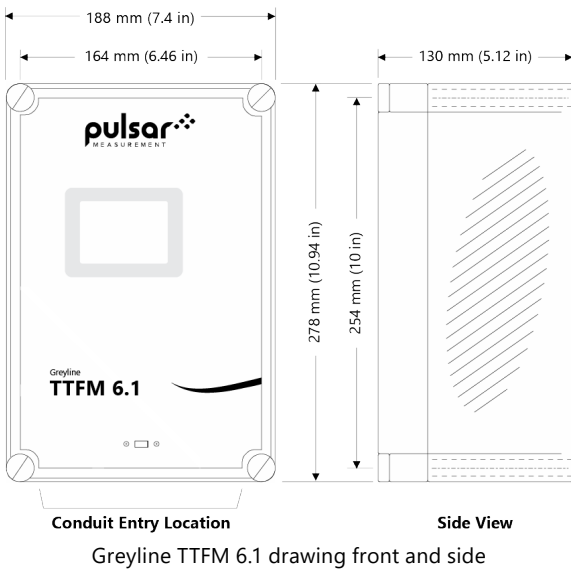
Operating Parameters:	For clean liquids in full pipes with less than 2% solids or gas bubbles
Programming:	Built-in 5-button keypad with English, French, and Spanish menu language selection
Electronics Enclosure:	NEMA4X (IP66) polycarbonate with clear, shatterproof cover
Accuracy:	±1% of reading from 457.2 mm/s to 12.2 m/s (18 in/s to 40 ft/s) and ±4.6 mm/s (±0.2 in/s) for velocity below 4.6 mm/s (1.8 in/s). Repeatability & Linearity: ±0.25%
Display:	White, backlit matrix — displays 5-digit flow rate with floating decimal, 14-digit totalizer, relay status, operating mode, and calibration menu
Power Input:	<ul style="list-style-type: none">• 100-240 V AC (50/60 Hz), 10 VA maximum• Optional: 9-32 V DC, 10 W maximum
Analog Output:	Isolated 4-20mA, 0-5 V, 1 kΩ load maximum, programmable offset
Control Relays:	<ul style="list-style-type: none">• 2 Relays, form 'C' dry contacts rated 5 A SPDT; programmable flow alarm and/or flow proportional pulse• Optional: 4 additional (6 total), rated 5 A SPDT
Data Logger:	Built-in 128 MB data logger with USB output and Windows software. Capacity for approx. 26 million data points
Operating Temp. (Electronics):	-20 °C to 60 °C (-5 °F to 140 °F)
Approximate Shipping Weight:	5.5 kg (12 lb)
Approvals:	CE, CSA, UL/EN 61010-1

TRANSDUCER SPECIFICATIONS

Pipe Diameter:	<ul style="list-style-type: none">• SE16A: Recommended for 15 mm to 40 mm (0.5 in to 1.5 in), Suitable for 15 mm to 150 mm (0.5 in to 6 in)• SE16B: Recommended for 50 mm to 250 mm (2 in to 10 in), Suitable for 50 mm to 1,200 mm (2 in to 48 in)• SE16C: Recommended for 300 mm to 1,200 mm (12 in to 48 in), Suitable for 100 mm to 1,200 mm (4 in to 48 in)
Flow Velocity Range:	±21.3 mm/s to 12.2 m/s (±0.07 ft/s to 40 ft/s)
Pipe Materials:	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
Operating Frequency:	<ul style="list-style-type: none">• SE16A: 2.56 MHz• SE16B: (standard): 1.28 MHz• SE16C: 640 kHz
Operating Temperature:	-40 °C to 150 °C (-40 °F to 300 °F)
Transducer Mounting Kit:	<ul style="list-style-type: none">• SE16A: Includes stainless steel track with pipe clamps, built-in ruler, and coupling compound.• SE16B: Includes set of stainless steel transducer brackets, clamps, alignment bar, and coupling compound.• SE16C: Includes set of stainless steel transducer brackets, clamps, alignment bar with built-in ruler, and coupling compound.
Transducer Cables:	Triaxial, 7.6 m (25 ft) with BNC connectors and seal jackets (extendable up to 152.4 m (500 ft))
Hazardous Locations:	<ul style="list-style-type: none">• Non-incendive for Class I, Div 2, Groups A, B, C, D• Optional: Intrinsically safe for Class I, Div 1, Groups C, D; Class II, Groups E, F, G; Class III; Encl. Type 4

POPULAR OPTIONS

Industrial Automation Protocols:	Modbus RTU via RS485 or HART (field selectable)
Transducer Cables:	<ul style="list-style-type: none">• 15.2 m (50 ft) triaxial with BNC connectors and seal jackets• 30.5 m (100 ft) triaxial with BNC connectors and seal jackets
Enclosure Heater:	Thermostatically controlled to -40 °C (-40 °F) — recommended for temperatures below 0 °C (32 °F)
Sunscreen:	Enclosure sunscreen for outdoor installations



Delivering the Measure of Possibility

Pulsar Measurement offers worldwide professional support for all of our products, and our network of global partners all offer full support and training. Our facilities in Malvern, UK and Largo, USA are home to technical support teams who are always available to answer your call or attend your site when required. Our global presence, with direct offices in the UK, USA, Canada, and Malaysia allow us to create close relationships with our customers and provide service, support, training, and information throughout the lifetime of your product.

By taking a step forward in echo processing technology, Pulsar Measurement addresses applications previously thought to be beyond the scope of ultrasonic measurement. This technology improves signal processing at the transducer head which has made it possible to increase resistance to electrical noise, enabling the transducer to 'zone in' on the true echo.

For more information, please visit our website:

www.pulsarmeasurement.com



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