

HEDLAND®

HTTF Transit Time Ultrasonic Flow Meter



- Reduced material costs: clamp-on sensor eliminates the need for in-line flanges, pipe fittings, strainers, and filters
- Reduced installation time: the HTTF may be installed and fully operational within minutes – no need to break into pipelines
- Non-intrusive system is tolerant of minimal amounts suspended solids and gas pockets
- Available for line sizes from ½" and larger
- Offered with or without a local display
- Provides rate and total (forward, reverse and net)
- 4-20 mA and pulse outputs for direct interface to data collection systems



1-800-HEDLAND

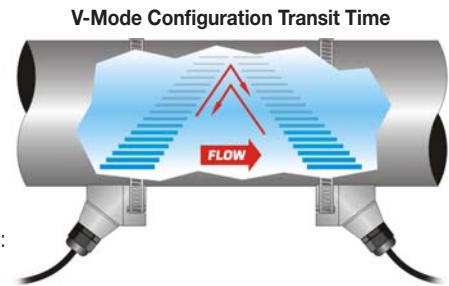
hedland.com

HTTF Transit Time Ultrasonic Flow Meter

Technology and Specifications

Operating Principle

Transit time flow meters utilize two transducers which function as both ultrasonic transmitters and receivers. The flow meters operate by alternately transmitting and receiving a frequency modulated burst of sound energy between the two transducers. The burst is first transmitted in the direction of fluid flow and then against fluid flow. Since sound energy in a moving liquid is carried faster when it travels in the direction of fluid flow (downstream) than it does when it travels against fluid flow (upstream), a differential in the times of flight will occur. The sound's time of flight is accurately measured in both directions and the difference in time of flight calculated. The liquid velocity (V) inside the pipe can be related to the difference in time of flight (dt) through the following equation: $V = K \cdot D \cdot dt$, where K is a constant and D is the distance between the transducers.



Specifications

DESCRIPTION	SPECIFICATION		
Liquid Types	Most clean liquids or liquids containing small amounts of suspended solids		
Power Requirements	11-30 VDC @ 0.25A Max.		
Velocity	0.1 to 40 FPS (0.03 to 12 MPS), bi-directional		
Inputs/Outputs	4-20mA Output (standard output)		Totalizer Pulse
	Resolution	12-bit for all outputs	Operation
	Power	Source	Normal state - High; Pulses low with display total increments
	Insertion loss	5V maximum	Pulse duration
	Loop impedance	900 Ohms maximum	Source/sink
	Isolation	Can share ground common with power supply — isolated from piping system	Logic
			5 VDC
	Turbine Frequency Output/TTL -Pulse Output		
	Switch selectable		
	Type	Non-ground referenced AC / Ground referenced square wave	Frequency range
	Amplitude	500mVpp minimum / 5VDC	Duty cycle
			0-1,000Hz 50% ±10%
Display	Type: 2 line x 8 character LCD; Top row: 0.7" (18 mm) tall, 7-segment; Bottom row: 0.35" (9 mm) tall, 14-segment Rate: 8 maximum rate digits, lead zero blanking Total: 8 maximum totalizer digits, exponential multipliers from -1 to +6		
Units	Engineering Units: Feet, gallons, ft ³ , million-gal, barrels (liquid & oil), acre-feet, lbs, meters, m ³ , liters, million-liters, kg Rate: Second, minute, hour, day		
Ambient Temperature	General Purpose: -40 to +185 °F (-40 to +85 °C); Hazardous Locations Integral Mount: 0 to +105 °F (-20 to +40 °C)		
Pipe Surface Temperature	Integral Mount and HTTS: -40 to +185 °F (-40 to +85 °C), HTTH: -40 to +350 °F (-40 to +176 °C) HTTN/HTTC: -40 to +250 °F (-40 to +121 °C)		
Enclosure	NEMA 3 (Type 3) ABS or polycarbonate, PVC and Ultem® (Integral System), brass or SS hardware, 3W x 6L x 2.5H inches (75W x 150L x 63H mm), pipe mount		
Transducer Type	Clamp-on, uses time of flight ultrasonics		
Pipe Sizes	½ inch (12 mm) and larger		
Pipe Materials	Carbon steel, stainless steel, copper, and plastic		
Accuracy	HTTN/HTTH ±1% of reading at rates > 1 FPS (0.3 MPS), ±0.01 FPS (±0.003 MPS) at rates lower than 1 FPS; HTTS/HTTC 1" and larger units ±1% of reading from 10-100% of measuring range, ±0.01 FPS (±0.003 MPS) at rates lower than 10% of measuring range; ½" and ¾" units ±1% FS. Refer to the Dimensional Specifications page for applicable measuring ranges for each HTTS/HTTC transducer model.		
Repeatability	±0.5% of reading		
Response Time	0.3 to 30 seconds, adjustable		
Protection	Reverse-polarity, surge suppression		
Installation	Integral Systems and Remote Systems with HTTN and HTTS Transducers. General Requirements: ANSI/ISA 82.02.01 Hazardous Locations: ANSI/ISA 12.12.01 Class I Div 2, Groups C & D		
ULTRALINK™ Utility	Windows® compatible software utility, requires serial communication cable Windows 2000, Windows XP, Windows Vista®, Windows® 7 compatible		



HTTF Transit Time Ultrasonic Flow Meter

Part Numbering Information

Integral System - 1/2" to 2"

HTTF - - **NN**

Display Options

- 1- No display-ABS enclosure
- 2- Rate & Totalizer display-ABS enclosure
- 3- No display -polycarbonate enclosure
- 4- Rate & Totalizer display-polycarbonate enclosure

Output

- 1- 4-20 mA and TTL Pulse
- 3- Totalizer Pulse

Connector Options

- N- 1/2" Conduit Hole
- A- Water-tight Cable Clamp
- C- Circular MIL-style Connector
- D- 1/2" Flexible Conduit Connector

Pipe Size

- | | | | |
|-----------------------------|--------------------------|--------------------------|--------------------------|
| A - 1/2" ANSI Pipe | G - 1/2" Copper | M - 1/2" Tubing | 1 - 20 mm Tubing* |
| B - 3/4" ANSI Pipe | H - 3/4" Copper | N - 3/4" Tubing | 2 - 25 mm Tubing* |
| C - 1" ANSI Pipe | I - 1" Copper | P - 1" Tubing | 3 - 32 mm Tubing* |
| D - 1-1/4" ANSI Pipe | J - 1-1/4" Copper | Q - 1-1/4" Tubing | 4 - 40 mm Tubing* |
| E - 1-1/2" ANSI Pipe | K - 1-1/2" Copper | R - 1-1/2" Tubing | 5 - 50 mm Tubing* |
| F - 2" ANSI Pipe | L - 2" Copper | S - 2" Tubing | 6 - 63 mm Tubing* |



(*Consult factory for availability)

Remote System - 1/2" and larger (12 mm and larger)

(A system consists of one HTTF part number and a choice of one large or small pipe transducer part number.)



HTTF - - **NN**

- #### System Size
- X- Large Pipe
 - Y- Small Pipe

Select Options from Integral System Table above



Large Pipe Transducer - Pipes larger than 2" (50 mm)

HTT - - - **N**

Type

- N** - Standard: +250 °F (+121 °C) (CPVC, Ultem®)
- H** - High Temp: +350 °F (+176 °C) (PTFE, Vespel®)

Installation

- N** - General Purpose

Cable Length

- 020** - 20 feet (6 m)
- 050** - 50 feet (15 m)
- 100** - 100 feet (30 m)

Conduit Length

- 000** - 0 feet (0 m)
- 020** - 20 feet (6 m)
- 050** - 50 feet (15 m)
- 100** - 100 feet (30 m)

Conduit Type

- N** - None
- A** - Flexible armored

Small Pipe Transducer-1/2" to 2" (12 mm to 50 mm)

HTT - - -

Type

- S** - Standard: +185 °F (+85 °C) (PVC, Ultem®)
- C** - High Temp: +250 °F (+121 °C) (CPVC, Ultem®)

Nominal Pipe Size

- D** - 1/2"
- F** - 3/4"
- G** - 1"
- H** - 1-1/4"
- J** - 1-1/2"
- L** - 2"

* Specify Pipe Size **Y** when used with HTTF for all pipe sizes except 2" ANSI & Copper.

Cable Length

- 020** - 20 feet (6 m)
- 050** - 50 feet (15 m)
- 100** - 100 feet (30 m)

Conduit Length

- 000** - 0 feet (0 m)
- 020** - 20 feet (6 m)
- 050** - 50 feet (15 m)
- 100** - 100 feet (30 m)

Conduit Type

- N** - None
- A** - Flexible armored

Pipe Type

- P** - ANSI Pipe
- C** - Copper Pipe
- T** - Tubing

Accessories

PC Cable w/**ULTRALINK™** software
90-240 VAC Power Supply

Part Number

HTTF-ULINK
HTTF-ACPWR

HTTF Transit Time Ultrasonic Flow Meter

Application Data Sheet

Job Name/Reference #: _____ Date: _____
Name: _____ Title: _____
Company: _____ E-Mail: _____
Address: _____
City: _____ State / Province: _____
ZIP / Postal: _____ Country: _____
Telephone: _____ Fax: _____

Liquid Type: Water _____ Wastewater _____ Oil _____ Other _____

Liquid Composition (% volume, solids or aeration): _____

Max. Liquid Temp: _____ °F/°C Viscosity: _____

Full Pipe During Flow Measurement? Yes No

Pipe O.D. : _____ inches _____ mm Schedule/Class: _____ Material: _____

Liner (if applicable): Type _____ Thickness _____

Length of Straight Pipe (in pipe diameters): _____ Upstream _____ Downstream

Nearest Obstruction (i.e. elbow, valve): _____

Flow Range: Minimum _____ Maximum _____ Nominal _____

Flow Units: GPM _____ LPM _____ Other _____

Display: None Rate / Total Power Requirement: _____ AC/DC

Output Requirements: None 4-20mA Rate pulse

Environment: Indoor Outdoor Submersible Hazardous area

Other Requirements: _____

It is recommended that a Hedland application specialist review new HTTF applications before ordering. Fill out the information noted above and fax to Hedland at 800-245-3569. Please include contact information so Hedland personnel may contact you regarding any additional questions.



HTTF Transit Time Ultrasonic Flow Meter Installation Considerations

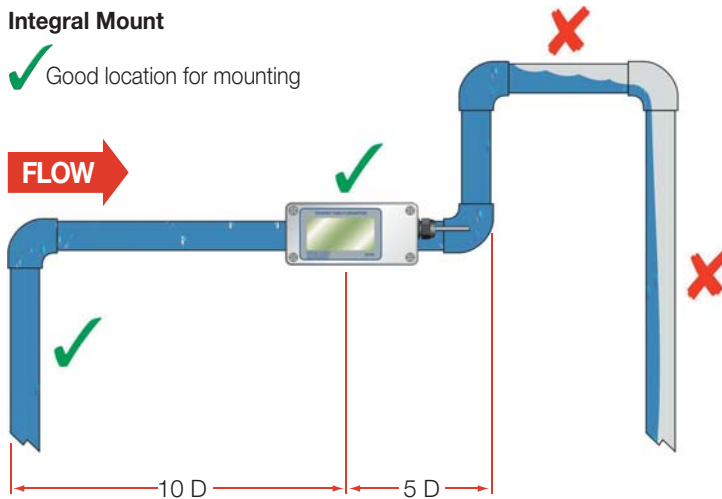
1. Select the optimum mounting location on the piping system – a **full** pipe with at least 10 straight pipe diameters upstream and 5 pipe diameters downstream with no flow disturbances.
2. Apply couplant grease to the two surfaces of the transducers that contact the pipe.
3. Mount the flow meter or remote transducers onto the pipe and secure. On horizontal pipe, transducer mounting location should be approximately 45-degrees of the side of the pipe. On vertical pipes with upward flow, radial orientation does not matter.
4. Connect and apply DC power.
5. Connect the 4-20 mA, frequency or both outputs to the monitoring system.

Acoustic Couplant Application

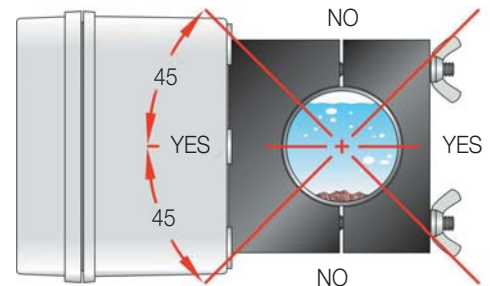


Integral Mount

✓ Good location for mounting

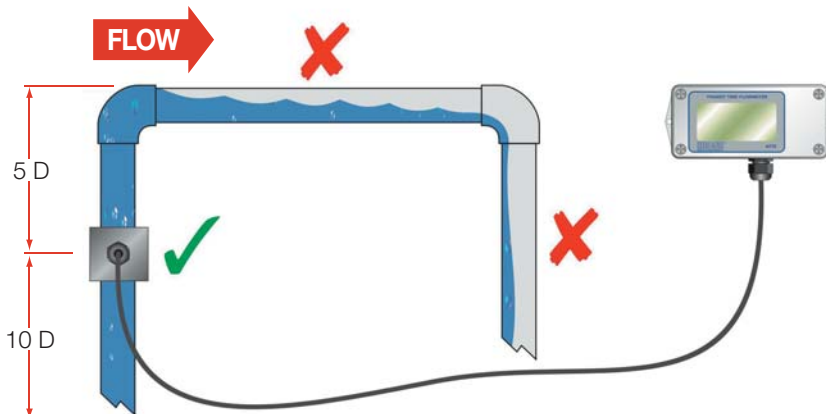


Flow Meter Mounting Orientation



Remote Mount

✓ Good location for mounting

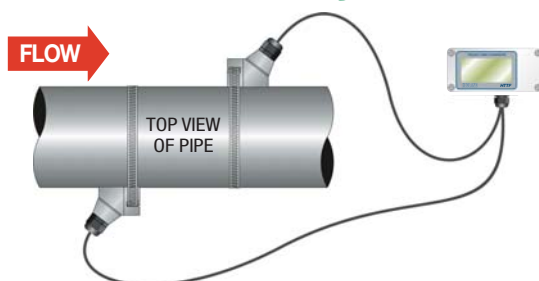


Vertical Pipe Mount

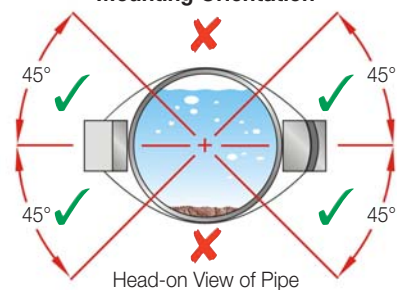
Flow Meter Transducer can be Mounted in any Orientation

Remote Mount - Large Pipe

✓ Good location for mounting



Remote Large Pipe Transducer Mounting Orientation

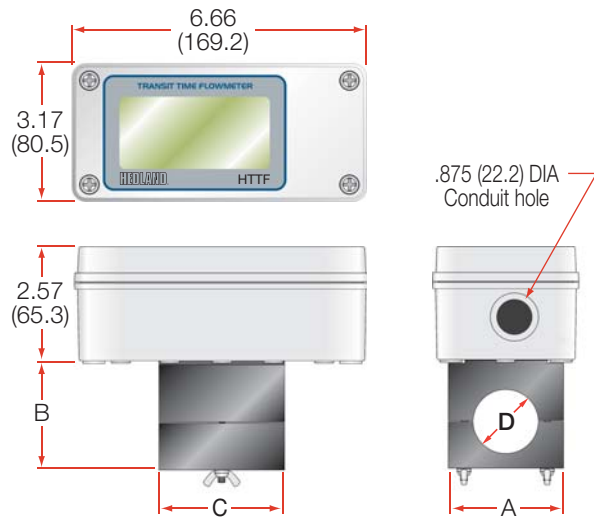


HTTF Transit Time Ultrasonic Flow Meter

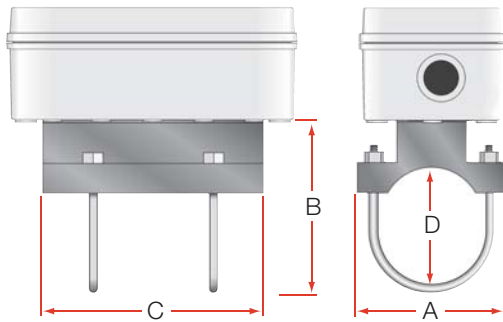
Dimensional Specifications

Mechanical Dimensions: Inches (mm)

Integral System



U-Bolt Connections (ANSI & Copper 2 inch Models)

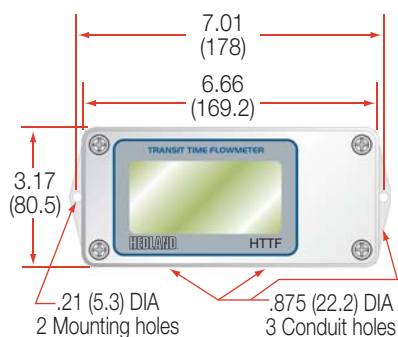


HTTS/HTTC Transducer Dimensions: Inches (mm)

Pipe Size	Pipe Material	A	B	C	D	Measuring Range
1/2"	ANSI	2.46 (62.5)	2.36 (59.9)	2.66 (67.6)	0.84 (21.3)	2 - 38 GPM 8 - 144 LPM
	Copper	2.46 (62.5)	2.36 (59.9)	3.33 (84.6)	0.63 (15.9)	1.8 - 27 GPM 7 - 102 LPM
	Tubing	2.46 (62.5)	2.28 (57.9)	3.72 (94.5)	0.50 (12.7)	1.5 - 18 GPM 6 - 68 LPM
3/4"	ANSI	2.46 (62.5)	2.57 (65.3)	2.66 (67.6)	1.05 (26.7)	2.75 - 66 GPM 10 - 250 LPM
	Copper	2.46 (62.5)	2.50 (63.5)	3.56 (90.4)	0.88 (22.2)	2.5 - 54 GPM 10 - 204 LPM
	Tubing	2.46 (62.5)	2.50 (63.5)	3.56 (90.4)	0.75 (19.0)	2.5 - 45 GPM 10 - 170 LPM
1"	ANSI	2.46 (62.5)	2.92 (74.2)	2.86 (72.6)	1.32 (33.4)	3.5 - 108 GPM 13 - 409 LPM
	Copper	2.46 (62.5)	2.87 (72.9)	3.80 (96.5)	1.13 (28.6)	3.5 - 95 GPM 13 - 360 LPM
	Tubing	2.46 (62.5)	2.75 (69.9)	3.80 (96.5)	1.00 (25.4)	3.5 - 85 GPM 13 - 320 LPM
1-1/4"	ANSI	2.80 (71.0)	3.18 (80.8)	3.14 (79.8)	1.66 (42.2)	5 - 186 GPM 19 - 704 LPM
	Copper	2.46 (62.5)	3.00 (76.2)	4.04 (102.6)	1.38 (34.9)	4.5 - 152 GPM 17 - 575 LPM
	Tubing	2.46 (62.5)	3.00 (76.2)	4.04 (102.6)	1.25 (31.8)	4 - 136 GPM 15 - 514 GPM
1-1/2"	ANSI	3.02 (76.7)	3.42 (86.9)	3.33 (84.6)	1.90 (48.3)	6 - 250 GPM 23 - 946 LPM
	Copper	2.71 (68.8)	2.86 (72.6)	4.28 (108.7)	1.63 (41.3)	5 - 215 GPM 19 - 814 LPM
	Tubing	2.71 (68.8)	3.31 (84.1)	4.28 (108.7)	1.50 (38.1)	5 - 200 GPM 19 - 757 LPM
2"	ANSI	3.70 (94.0)	3.42 (86.9)*	5.50 (139.7)	2.375 (60.3)*	8 - 420 GPM 30 - 1590 LPM
	Copper	3.70 (94.0)	3.38 (85.9)*	5.50 (139.7)	2.125 (54.0)*	8 - 375 GPM 30 - 1419 LPM
	Tubing	3.21 (81.5)	3.85 (98.0)	4.75 (120.7)	2.00 (50.8)	8 - 365 GPM 30 - 1381 LPM

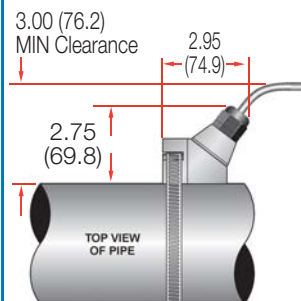
* Varies due to U-bolt configuration

Remote System



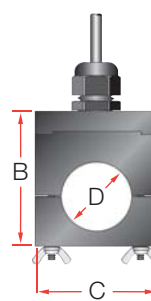
HTTN/HTTH

Pipes larger than 2" (50 mm)



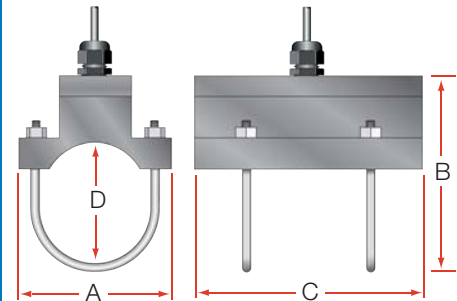
HTTS/HTTC

Pipes 1/2" to 2" (12 mm to 50 mm)



HTTS/HTTC U-Bolt Connections

(ANSI & Copper 2 inch Models)



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