HEDLAND®

HTTF Transit Time Ultrasonic Flow Meter

- Non-intrusive system is tolerant of suspended solids and gas pockets
- Clamp-on design provides easy, low cost installation
- Available for line sizes from 1/2" up to 100"
- 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
- Designed for maintenance free operation
- Software utility allows in-field configuration

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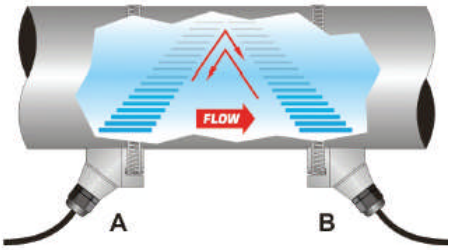
Technology and Specifications

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.



Reflect-Mode Configuration
Transit Time

Specifications

DESCRIPTION	SPECIFICATION
Liquid Types	Most clean liquids or liquids containing up to 40% suspended solids or aeration
Power	11-30 VDC @ 0.25 A
Velocity	0.1 to 40 FPS (0.03 to 12.4 MPS)
Inputs/Outputs	**4-20 mA Output (standard)** Resolution: 12-bit for all outputs Power: Source Insertion loss: 5 V maximum Loop impedance: 900 Ohms maximum Isolation: Can share ground common with power supply – isolated from piping system **Turbine Frequency Output / TTL-Pulse Output (standard)** Switch selectable Type: Non-ground referenced AC / Ground referenced square wave Amplitude: 100 mV peak to peak minimum / 5 VDC Frequency range: 0 - 1,000 Hz Duty cycle: 50% ±10%
Display	2 line x 8 character LCD; 0.7", 7 segment top row; 0.35", 14 segment bottom row Rate: 8 maximum digits, lead zero blanking Total: 8 maximum digits, exponential multipliers from -1 to +6
Units	Engineering: feet, gallons, ft³, million-gal, barrels (liquor & oil), acre-feet, lbs, meters, m³, liters, million-liters, kg Rate: sec, min, hr, day
Ambient Temperature	General purpose: 0 °F to +185 °F (-20 °C to +85 °C) Hazardous locations: 0 °F to 105 °F (-20 °C to +40 °C)
Liquid Temperature	0 °F to +185 °F (-20 °C to +85 °C)
Enclosure	NEMA 3 (Type 3) ABS or polycarbonate
Transducer	CPVC, Ultem®, brass or stainless steel hardware
Line Sizes	1/2" to 100" (12 mm to 2540 mm)
Line Materials	Carbon steel and stainless steel ANSI pipe; copper and plastic tubing
Accuracy	±1% of reading at rates above 1 FPS (0.3 MPS) ±0.01 FPS (0.003 MPS) of reading at rates lower than 1 FPS (0.3 MPS)
Response Time	0.3-30 seconds, adjustable
Protection	Reverse-polarity, surge suppression
Approvals	General requirements: ANSI/ISA 582-01 Hazardous locations: ANSI/ISA 12.12.01 Class I Div. 2, Groups C & D (Integral Systems only) CSA C22.2 No. 213, E79-15-95 (HTTF3 and HTTF4 models only)
UltraLink™ Utility	Windows®-based software utility, requires serial communication cable and Windows® 95, 98, 2000 or XP

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Part Numbering Information

Integral System - 1/2" to 2"

HTTF □ - □ □ 1 - N N

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 Pulse

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

Pipe Size

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

(Consult factory for availability)

Remote System - 1/2" to 100"

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

HTTF □ - □ □ 1 - N N

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

Select Options from Integral System Table above

Large Pipe Transducer - 2" to 100"

HTT □ - □ □ □ - □ □ □ □ - N

Type
- **N** - Standard (CPVC, Ultem®)
- **H** - High Temp (TFP, Vespel®)

Cable Length
- **020** - 20 feet (6.1 m)
- **050** - 50 feet (15 m)
- **100** - 100 feet (30 m)

Conduit Type
- **N** - None – Bare RG59 Cable
- **A** - Flexible armored

Conduit Length
- **000** - 0 feet (0 m)
- **020** - 20 feet (6.1 m)
- **050** - 50 feet (15 m)
- **100** - 100 feet (30 m)

Location
- **N** - Ordinary Area

Small Pipe Transducer - 1/2" to 2"

HTTS □ □ - □ □ □ - □ □ □ □

Nominal Pipe Size
- **D** - 1/2 inch
- **F** - 3/4 inch
- **G** - 1 inch
- **H** - 1-1/4 inch
- **J** - 1-1/2 inch
- **L** - 2 inch

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

Cable Length
- **020** - 20 feet (6.1 m)
- **050** - 50 feet (15 m)
- **100** - 100 feet (30 m)

Conduit Type
- **N** - None – Bare RG59 Cable
- **A** - Flexible armored

Conduit Length
- **000** - 0 feet (0 m)
- **020** - 20 feet (6.1 m)
- **050** - 50 feet (15 m)
- **100** - 100 feet (30 m)

Accessories	Part Number
PC Cable w/UltraLink™ software	HTTF-ULINK
90-240 VAC Power Supply	HTTF-ACPWR

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Application Data Sheet

Job Name/Reference #: _____

_____

Date: _____

Name: _____ Title: _____

Company: _____ E-Mail: _____

Address: _____

City: _____ State / Province: _____

Zip / Postal Code: _____ Country: _____

Telephone: _____ Fax: _____

Liquid Type: Water ____ Wastewater ____ Oil ____ Other _____

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

Full Pipe during flow measurement: ☐ Yes ☐ No **Max. Liquid Temp:** _____ °F/°C **Viscosity:** _____

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 Unit:** GPM___ LPM___ Other _____

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

Output Requirements: ☐ None ☐ 4-20mA ☐ Rate Pulse

Environment: ☐ Indoor ☐ Outdoor ☐ Submersible ☐ Hazardous Area

Application Notes: _____

_____

_____

_____

_____

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 262-639-2267. Please include contact information so Hedland personnel may contact you regarding any additional questions.

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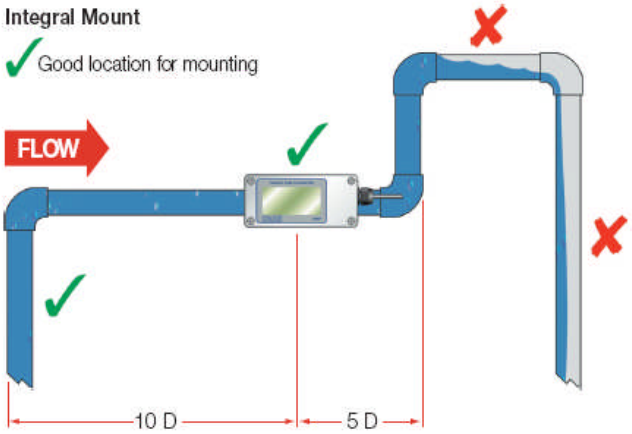
Installation Considerations

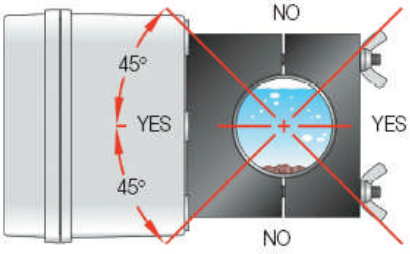
1. Select the optimum mounting location on the piping system – a **full** pipe with at least 10 straight pipe diameters upstream and 5 pipe diameters downstream with no flow disturbances.
2. Apply couplant grease to the two surfaces of the transducers that contact the pipe.
3. Mount the flow meter or 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

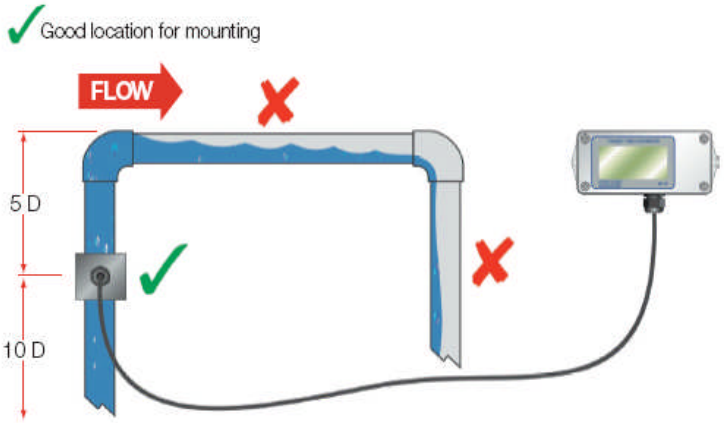
Integral Mount



Flow Meter Mounting Orientation



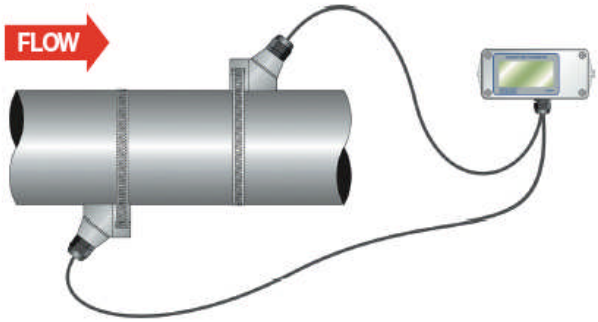
Remote Mount



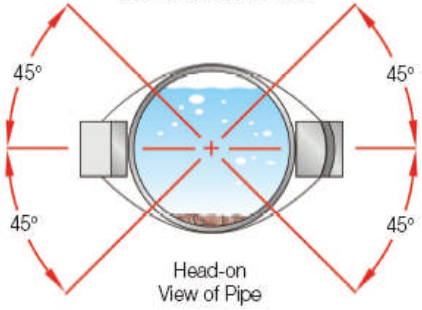
Vertical Pipe Mount

Flow Meter Transducer can be Mounted in any Orientation

Remote Mount - Large Pipe



Remote Large Pipe Transducer Mounting Orientation



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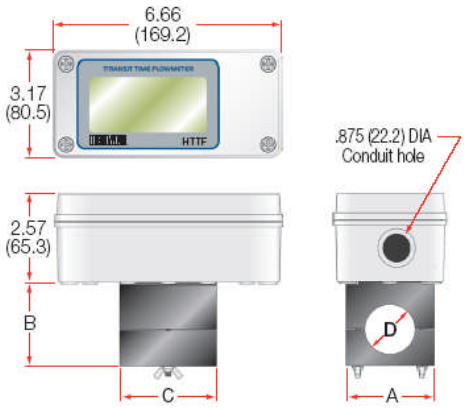
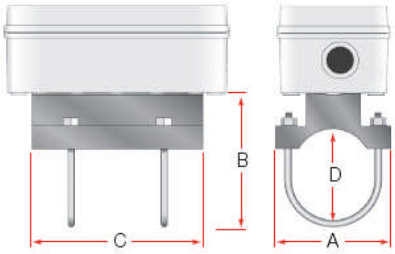
Dimensional Specifications

Mechanical Dimensions: Inches (mm)

Integral System

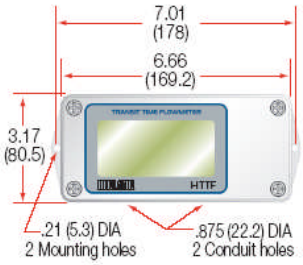


U-Bolt Connections (ANSI & Copper 2 inch Models)

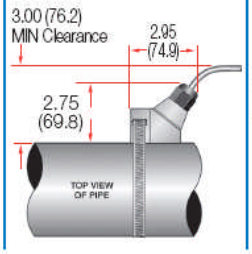


Pipe Size	Pipe Material	A	B	C	D	Measuring Range
1/2"	ANSI	2.46 (62.5)	1.83 (46.4)	2.66 (67.6)	0.84 (21.3)	.5 - 25 GPM 2 - 100 LPM
	Copper	2.46 (62.5)	1.82 (46.1)	3.33 (84.6)	0.63 (15.9)	.5 - 25 GPM 2 - 100 LPM
	Tubing	2.46 (62.5)	1.72 (43.6)	3.72 (94.5)	0.50 (12.7)	.5 - 25 GPM 2 - 100 LPM
3/4"	ANSI	2.46 (62.5)	2.04 (51.7)	2.66 (67.6)	1.05 (26.7)	1 - 55 GPM 4 - 200 LPM
	Copper	2.46 (62.5)	1.94 (49.3)	3.56 (90.4)	0.88 (22.2)	1 - 55 GPM 4 - 200 LPM
	Tubing	2.46 (62.5)	1.89 (47.9)	3.56 (90.4)	0.75 (19.0)	1 - 55 GPM 4 - 200 LPM
1"	ANSI	2.46 (62.5)	2.35 (59.6)	2.86 (72.6)	1.32 (33.4)	2 - 100 GPM 8 - 375 LPM
	Copper	2.46 (62.5)	2.31 (58.7)	3.80 (96.5)	1.13 (28.6)	2 - 100 GPM 8 - 375 LPM
	Tubing	2.46 (62.5)	2.26 (57.4)	3.80 (96.5)	1.00 (25.4)	2 - 100 GPM 8 - 375 LPM
1-1/4"	ANSI	2.80 (71.0)	2.64 (67.1)	3.14 (79.8)	1.66 (42.2)	4 - 150 GPM 15 - 570 LPM
	Copper	2.46 (62.5)	2.43 (61.7)	4.04 (102.6)	1.38 (34.9)	4 - 150 GPM 15 - 570 LPM
	Tubing	2.46 (62.5)	2.39 (60.6)	4.04 (102.6)	1.25 (31.8)	4 - 150 GPM 15 - 570 LPM
1-1/2"	ANSI	3.02 (76.7)	2.88 (73.2)	3.33 (84.6)	1.90 (48.3)	5 - 220 GPM 18 - 830 LPM
	Copper	2.71 (68.8)	2.81 (71.2)	4.28 (108.7)	1.63 (41.3)	5 - 220 GPM 18 - 830 LPM
	Tubing	2.71 (68.8)	2.76 (70.1)	4.28 (108.7)	1.50 (38.1)	5 - 220 GPM 18 - 830 LPM
2"	ANSI	3.70 (94.0)	3.80 (96.6)	5.50 (139.7)	2.38 (60.3)	8 - 400 GPM 30 - 1500 LPM
	Copper	3.70 (94.0)	3.55 (90.2)	5.50 (139.7)	2.13 (54.0)	8 - 400 GPM 30 - 1500 LPM
	Tubing	3.21 (81.5)	3.33 (84.6)	4.75 (120.7)	2.00 (50.8)	8 - 400 GPM 30 - 1500 LPM

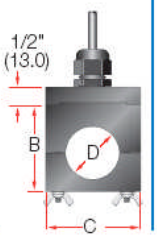
Remote System



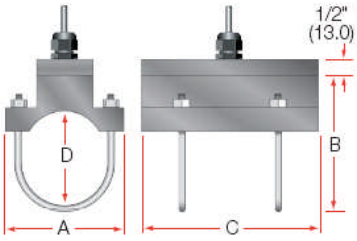
HTTN



HTTS



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



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