Dynasonics®
Ultrasonic Flow Meters

Transit Time Flow Meters

TFXL Ultrasonic

DESCRIPTION

The TFXL ultrasonic transit time flow meter measures most clean liquids and liquids with small amounts of suspended solids or aeration, such as surface water or sewage.

FEATURES

- Bi-directional flow measurement system
- Totalizer options include forward, reverse and net total
- UltraLink® software utility enables in-field flow meter configuration, calibration and troubleshooting, via laptop PC
- Compact enclosure uses large, easy-to-read digital display

BENEFITS

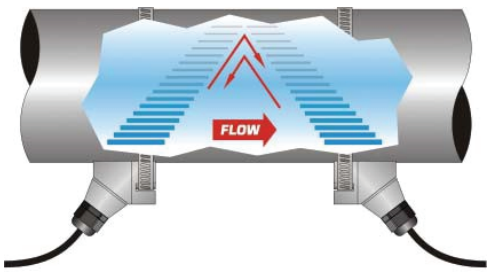
- Reduced material costs: Clamp-on sensor eliminates the need for in-line flanges, pipe fittings, strainers and filters.
- Reduced installation time: May be installed and fully operational within minutes. No need to break into pipelines.
- Reduced maintenance costs: With no moving parts, there is nothing on the TFXL to wear down—no repair kits or replacement parts are needed.
- Easy retrofit: With three standard outputs (4…20 mA, TTL pulse and simulated turbine frequency), the TFXL drops easily into existing DCS and flow monitoring systems.
- Reduced downtime: Installation may be performed on full pipes. No need to shut the process down for installation or maintenance.

APPLICATION

The TFXL ultrasonic flow meter clamps onto the outside of a pipe and does not contact the internal liquid. This advanced product provides instantaneous rate and accumulated flows along with 4…20 mA and pulse outputs. Compact integral mount systems can accommodate pipes/tubing two inches and smaller. Remote mount systems are also available for pipe/tubing sizes 1/2 in. (DN 15) and higher.

OPERATION

Transit time flow meters use two transducers that 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.



Badger Meter

TTM-DS-00960-EN-07 (April 2016)

Product Data Sheet

SPECIFICATIONS

System

Liquid Types	Most clean liquids or liquids containing small amounts of suspended solids or gas bubbles	
Velocity Range	0.1…40 FPS (0.03…012 MPS)	
Flow Accuracy	DTTR/DTTN/DTTH DTTS/DTTC	±1% of reading or ±0.01 FPS (0.003 MPS), whichever is greater 1 in. (25 mm) and larger = ±1 % above 1 FPS (0.3 MPS) and ±0.01 FPS below 1 FPS 3/4 in. (19 mm) and smaller = ±1% of full scale
Ambient Temperature	General purpose Hazardous locations integral mount Hazardous locations DTTN	–40…185° F (–40…85° C) 0…105° F (–17…40° C) –40…185° F (–40…85° C)
Repeatability	±0.5% of reading	
Transducer Type	Clamp-on, uses time-of-flight ultrasonics	
Protection	Reverse polarity, surge suppression	
Certifications	Remote mount transmitter and integral mount transmitter with transducers	General purpose standards: UL 61010-1 and CSA C22.2 No. 61010-1 Hazardous location designation and standards: Class I, Division 2, Groups C and D UL1604, CSA C22.2 No. 213
	Hazardous location transducers (DTTN with I.S. option)	Hazardous location designation and standards: Class I, Division 1, Groups C and D, T5 UL913:2002, UL916 CAN/CSA C22.2 No. 0-10, C22.2 No. 142-M1987, C22.2 No. 157-92 Install with I.S. barrier D070-1010-002

Transmitter

Power Requirements	12…28V DC @ 0.25A	
Display	Type Rate Total	2 line x 8 character LCD 8 maximum digits with lead zero blanking 8 maximum digits with exponential multipliers from –1…6
Enclosure Rating	NEMA Type 3 (Type 3) ABS, PVC and Ultem (integral system), brass or SS hardware	
Units of Measure	Engineering units Rate	Feet, US gallons, cubic feet, million gallons, barrels (liquid and oil), acre-feet, lbs, meters, cubic meters, liters, million liters, kilograms Second, minute, hour, day
Outputs	Analog and TTL Frequency (Output option 1)	4…20 mA: 900 ohms max, internally powered, 12-bit resolution
		Selectable turbine meter simulation or square wave 0…1000 Hz, duty cycle 50% +/- 10% Square wave: 5V DC Turbine meter simulation: 500 mVpp minimum
	Totalizer pulse (Output option 3)	Source or sink, 5V DC, 2 mA maximum, pulse duration 30 ms, external resistor Normal state high with pulses low

Transducers

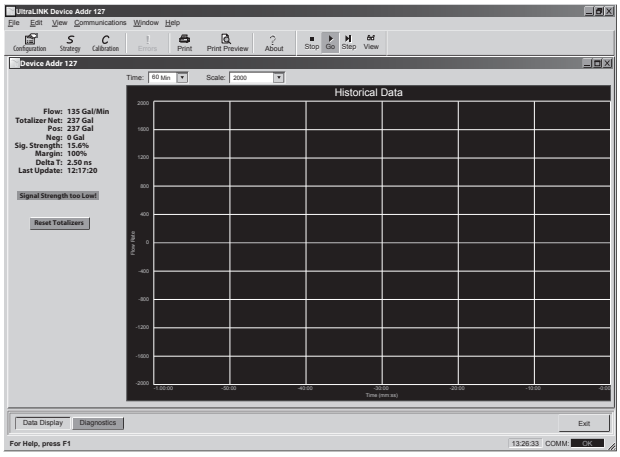
Transducer Construction	DTTR	NEMA 6*/IP67	PBT glass filled, Ultem, Nylon cord grip PVC cable jacket; –40…250° F (–40…121° C)
	DTTC	NEMA 6*/IP67	CPVC, Ultem, Nylon cord grip Polyethylene cable jacket; –40…185° F (–40…85° C)
	DTTN I.S.	NEMA 6P*/IP68	CPVC, Ultem, Nylon cord grip Polyethylene cable jacket; –40…185° F (–40…85° C)
	DTTH	NEMA 6*/IP67	PTFE, Vespel, Nickel-plated brass cord grip PFA cable jacket; –40…350° F (–40…176° C)
	DTTS	NEMA 6*/IP67	PVC, Ultem, Nylon cord grip PVC cable jacket; –40…140° F (–40…60° C)
	*NEMA 6 units: to a depth of 3 ft (1 m) for 30 days max. NEMA 6P units: to a depth of 100 ft (30 m) seawater equivalent density indefinitely.		
Cable Length	990 ft (300 meter) max. in 10 ft (3 m) increments; Submersible Conduit limited to 100 ft (30 m)		
Pipe/Tubing Sizes	1/2 in. (12 mm) and larger		
Pipe/Tubing Materials	Carbon steel, stainless steel, copper and plastic		

Software Utilities

ULTRALINK	Used to configure, calibrate and troubleshoot flow meter. Software is compatible with Windows 2000, Windows XP, Windows Vista and Windows 7

ULTRALINK SOFTWARE UTILITY

The flow meter must be programmed with the UltraLink software utility. The software is used to configure, calibrate and communicate with TFXL flow meters. Additionally, it has numerous troubleshooting tools to make diagnosing and correcting installation problems easier.



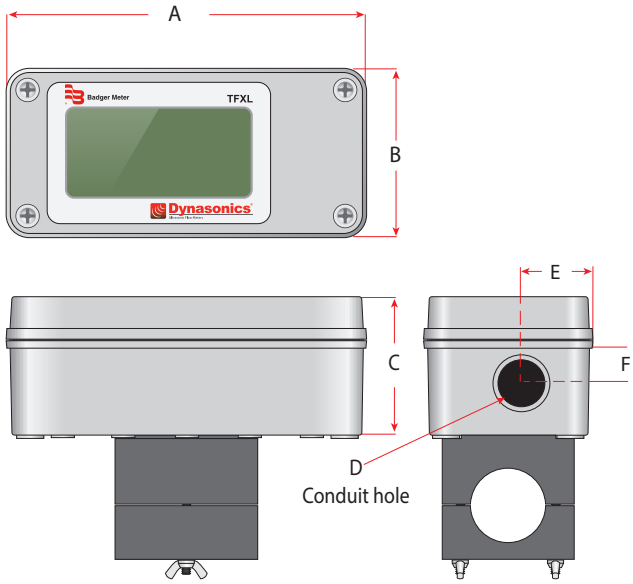
ADDITIONAL PARTS REQUIRED FOR CONFIGURATION

Part Number	Description
D010-0204-001	Configuration cable kit
D005-2116-004	USB-to-DB9 converter (required if PC does not have a serial port)

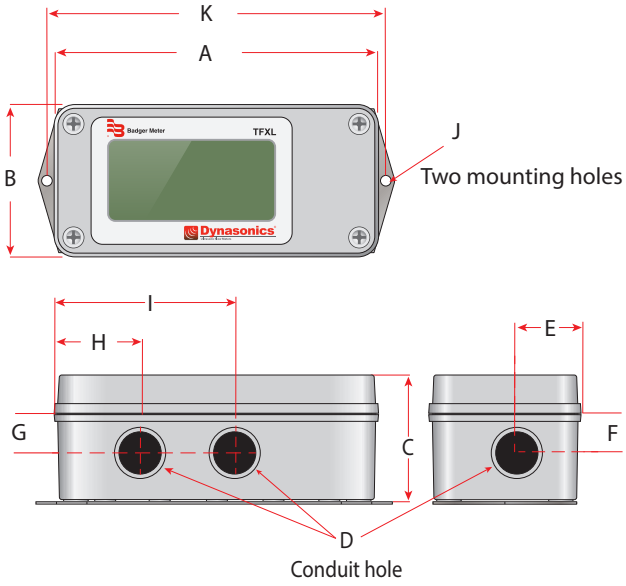
DIMENSIONS

Enclosures

Integral Enclosure



Remote Enclosure

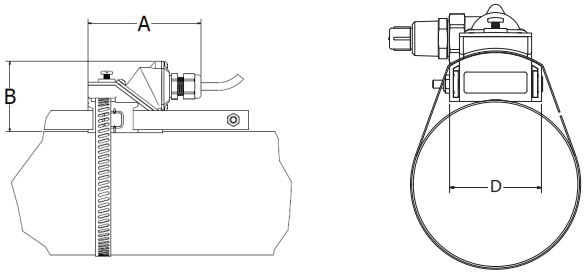


A in. (mm)	B in. (mm)	C in. (mm)	D DIA in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	I in. (mm)	J DIA in. (mm)	K in. (mm)
6.72 (170.7)	3.17 (80.5)	2.57 (65.3)	0.87 (22.2)	1.33 (33.8)	0.85 (21.6)	0.77 (19.6)	1.78 (45.2)	3.74 (95)	0.22 (5.6)	7.01 (178)

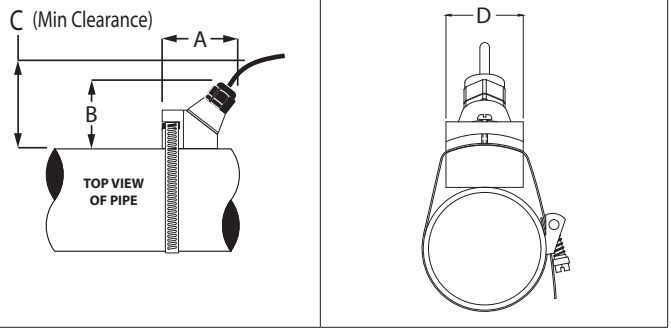
Transducers

Remote System with Large Pipes

DTTR

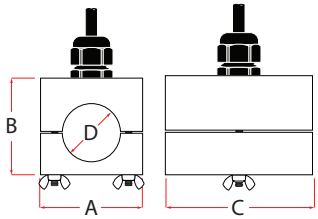
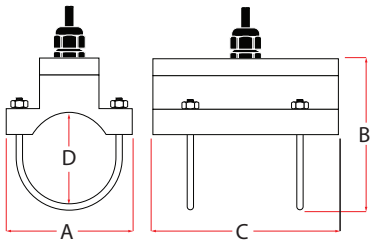


DTTN/DTTH

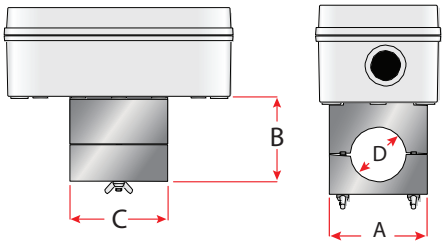
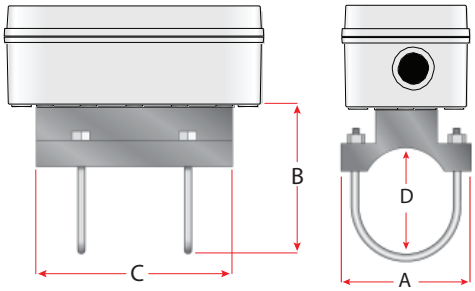


	DTTR	DTTN	DTTH
A	3.75 in. (95 mm)	2.95 in. (74.9 mm)	2.95 in. (74.9 mm)
B	2.35 in. (60 mm)	2.75 in. (69.8 mm)	2.75 in. (69.8 mm)
C	—	3.00 in. (76.2 mm)	3.00 in. (76.2 mm)
D	2.19 in. (56 mm)	1.70 in. (43.2 mm)	1.71 in. (43.4 mm)

Remote System with Small Pipes

DTTS/DTTC Pipes and Tubing 1/2…2 in. (12…50 mm)	**DTTS/DTTC U-Bolt Connections** ANSI/DS and Copper 2 in. (50 mm) Models
	

Integral System

DTTS/DTTC	**DTTS/DTTC U-Bolt Connections**
	

Pipe Size	Pipe Material	A	B	C	D	Measuring Range
1/2 in.	ANSI/DN	2.46 in. (62.5 mm)	2.36 in. (59.9 mm)	2.66 in. (67.6 mm)	0.84 in. (21.3 mm)	2.0…38 gpm (8…144 lpm)
	Copper	2.46 in. (62.5 mm)	2.36 in. (59.9 mm)	3.33 in. (84.6 mm)	0.63 in. (15.9 mm)	1.8…27 gpm (7…102 lpm)
	Tubing	2.46 in. (62.5 mm)	2.28 in. (57.9 mm)	3.72 in. (94.5 mm)	0.50 in. (12.7 mm)	1.5…18 gpm (6…68 lpm)
3/4 in.	ANSI/DN	2.46 in. (62.5 mm)	2.57 in. (65.3 mm)	2.66 in. (67.6 mm)	1.05 in. (26.7 mm)	2.75…66 gpm (10…250 lpm)
	Copper	2.46 in. (62.5 mm)	2.50 in. (63.5 mm)	3.56 in. (90.4 mm)	0.88 in. (22.2 mm)	2.5…54 gpm (10…204 lpm)
	Tubing	2.46 in. (62.5 mm)	2.50 in. (63.5 mm)	3.56 in. (90.4 mm)	0.75 in. (19.0 mm)	2.5…45 gpm (10…170 lpm)
1 in.	ANSI/DN	2.46 in. (62.5 mm)	2.92 in. (74.2 mm)	2.86 in. (72.6 mm)	1.32 in. (33.4 mm)	3.5…108 gpm (13…409 lpm)
	Copper	2.46 in. (62.5 mm)	2.87 in. (72.9 mm)	3.80 in. (96.5 mm)	1.13 in. (28.6 mm)	3.5…95 gpm (13…320 lpm)
	Tubing	2.46 in. (62.5 mm)	2.75 in. (69.9 mm)	3.80 in. (96.5 mm)	1.00 in. (25.4 mm)	3.5…85 gpm (13…320 lpm)
1-1/4 in.	ANSI/DN	2.80 in. (71.0 mm)	3.18 in. (80.8 mm)	3.14 in. (79.8 mm)	1.66 in. (42.2 mm)	5.0…186 gpm (19…704 lpm)
	Copper	2.46 in. (62.5 mm)	3.00 in. (76.2 mm)	4.04 in. (102.6 mm)	1.38 in. (34.9 mm)	4.5…152 gpm (17…575 lpm)
	Tubing	2.46 in. (62.5 mm)	3.00 in. (76.2 mm)	4.04 in. (102.6 mm)	1.25 in. (31.8 mm)	4.0…136 gpm (15…514 lpm)
1-1/2 in.	ANSI/DN	3.02 in. (76.7 mm)	3.40 in. (86.9 mm)	3.33 in. (84.6 mm)	1.90 in. (48.3 mm)	6.0…250 gpm (23…946 lpm)
	Copper	2.71 in. (68.8 mm)	2.86 in. (72.6 mm)	4.28 in. (108.7 mm)	1.63 in. (41.3 mm)	5.0…215 gpm (19…814 lpm)
	Tubing	2.71 in. (68.8 mm)	3.31 in. (84.1 mm)	4.28 in. (108.7 mm)	1.50 in. (38.1 mm)	5.0 …200 gpm (19…757 lpm)
2 in.	ANSI/DN	3.70 in. (94.0 mm)	3.42 in. (86.9 mm)*	5.50 in. (139.7 mm)	2.38 in. (60.3 mm)*	8.0…420 gpm (30…1590 lpm)
	Copper	3.70 in. (94.0 mm)	3.38 in. (85.9 mm)*	5.50 in. (139.7 mm)	2.13 in. (54.0 mm)*	8.0…375 gpm (30…1419 lpm)
	Tubing	3.21 in. (81.5 mm)	3.85 in. (98.0 mm)	4.75 in. (120.7 mm)	2.00 in. (50.8 mm)	8.0…365 gpm (30…1381 lpm)

* Varies due to U-bolt configuration

PART NUMBER CONSTRUCTION

Dynasonics Ultrasonic Flow Meters

TFXL - Transit Time

DTFXL [ ] - [ ] [ ] [ ] - [ ] [ ]

Model								
Transit Time Ultrasonic Flow Transmitter	DTFXL							
Display Options								
ABS Enclosure - Blind (No Display) C/US		1						
ABS Enclosure - With Rate and Total Display C/US		2						
Pipe Size/Measurement Range								
1/2 Inch ANSI Pipe			A					
3/4 Inch ANSI Pipe			B					
1 Inch ANSI Pipe			C					
1-1/4 Inch ANSI Pipe			D					
1-1/2 Inch ANSI Pipe			E					
2 Inch ANSI Pipe			F					
1/2 Inch Copper Tube			G					
3/4 Inch Copper Tube			H					
1 Inch Copper Tube			I					
1-1/4 Inch Copper Tube			J					
1-1/2 Inch Copper Tube			K					
2 Inch Copper Tube			L					
1/2 Inch O.D. Std Tube			M					
3/4 Inch O.D. Std Tube			N					
1 Inch O.D. Std Tube			P					
1-1/4 Inch O.D. Std Tube			Q					
1-1/2 Inch O.D. Std Tube			R					
2 Inch O.D. Std Tube			S					
Remote Mount | ***Use with DTTR/N/H***			X					
Remote Mount | ***Use with DTTS/C***			Y					
Connector Options								
None - (Two) 1/2 inch Conduit Holes				N				
(Two) Water Tight Cable Clamps				A				
(Two) 1/2 Inch Flexible Conduit Connectors				D				
Output Options								
4 … 20 mA and TTL Pulse					1			
Totalizer Pulse					3			
Reserved								
None (Reserved)							N	
Options								
None								N
CPVC Transducer Material | ***Integral Mount Options Only***								C
I.S. DTTN Transducer | ***Remote Option X Only***								F

PART NUMBER CONSTRUCTION—REMOTE FLOW TRANSDUCERS, SMALL PIPES 1/2…2 IN. (15…50 MM)

DTT				-		-		

Piping Environment

PVC -40…185° F (-40…85° c)	**S**
CPVC -40… 140° F (-40… 60° C)	**C**

Nominal Pipe Size

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

Pipe Type

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

Cable Length

20 ft (6.1 m)	**020**
50 ft (15 m)	**050**
100 ft (30 m)	**100**

Conduit Type

None - (Bare Twinax Cable)	**N**
Flexible Armored (LiquidTite)	**A**

Conduit Length

0 ft (0 m)	**000**
20 ft (6.1 m)	**020**
50 ft (15 m)	**050**
100 ft (30 m)	**100**

PART NUMBER CONSTRUCTION—REMOTE FLOW TRANSDUCERS, PIPES LARGER THAN 2 IN. (50 MM)

General Purpose

DTT		-		-			-	N

Transmitter Type				
Standard (1 MHz), 250° F (121° C) Max Temp.	R			
High Temperature (1 MHz), 350° F (176° C) Max Temp.	H			
Cable Length				
20 ft. (6.1 m)		020		
50 ft. (15 m)		050		
100 ft. (30 m)		100		
Conduit Type				
None			N	
Flexible Armored | ***Not available with high temperature DTTH transducer***			A	
Conduit Length				
None				000
20 ft. (6.1 m)				020
50 ft. (15 m)				050
100 ft. (30 m)				100

General Purpose, Submersible (IP68)

DTT		-		-	S	000	-	N

Transmitter Type		
Standard: 1 MHz	N	
Cable Length		
20 ft. (6.1 m)		020
50 ft. (15 m)		050
100 ft. (30 m)		100

Hazardous Location (Class 1, Division 1, Groups C and D)

DTT	N	-		-			-	F

Cable Length				
20 ft. (6.1 m)		020		
50 ft. (15 m)		050		
100 ft. (30 m)		100		
Conduit Type				
None			N	
Flexible Armored			A	
Conduit Length				
None				000
20 ft. (6.1 m)				020
50 ft. (15 m)				050
100 ft. (30 m)				100

Control. Manage. Optimize.

www.badgermeter.com

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