Dynasonics®
Ultrasonic Flow Meters

Transit Time Ultrasonic Flow Meters

TFX-500w Clamp-On Meter

DESCRIPTION

The TFX-500w transit time ultrasonic flow meter measures volumetric flow of clean water in pipes 10 in. or smaller. By clamping on the outside of the pipe, the ultrasonic meter installs without cutting or tapping the pipe.

FEATURES

- Clamp-on, non-invasive flow meter
- Bidirectional flow measurement system
- Measures flow rate, total and velocity of water flow
- Set up the meter through keypad interface or with SoloCUE® Flow Device Manager software
- Compact enclosure uses large, easy-to-read graphical display
- Modbus RTU or BACnet MS/TP over RS485 and BEACON®/AquaCUE® connectivity

BENEFITS

- Installs without cutting into the pipe
- Eliminates the costs of inline flanges and pipe fittings
- No moving parts to maintain
- No pressure head loss

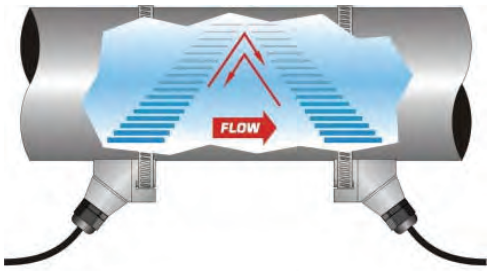
APPLICATION

The TFX-500w meter is well suited for building automation, water distribution and wastewater collection in new and retrofit applications. In addition to having lower installation costs than an inline flow meter, the TFX-500w meter can be installed while the system continues to operate without interruption.

By connecting the TFX-500w meter to Badger Meter® AquaCUE or BEACON analytics cloud service, the meter becomes part of a system that tracks and monitors water use for commercial buildings, campuses and other large facilities.

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-02183-EN-05 (October 2018)

Product Data Sheet

SPECIFICATIONS

System

Liquid Types	Water containing small amounts of suspended solids or gas bubbles	
Velocity Range	0.1…40 ft/s (0.03…12 m/s) bidirectional	
Flow Accuracy	DTTR/DTTN DTTC Easy Rail (DTTJ, DTTK)	±1% of reading or ±0.01 FPS (0.003 MPS), whichever is greater DTTC 3/4 in. and smaller are accurate to ± 1% full scale
Repeatability	±0.2% of reading	
Transducer Type	Clamp-on ultrasonics	
Certifications	Remote mount transmitter and integral mount transmitter with transducers	General Safety (option): FM Class 3810:2018, ANSI/ISA 61010-1:2012, ANSI/IEC 60529:2004, CAN/CSA-C22.2 No. 61010-1:2012, CSA C22.2 No. 60529:2005 CE: EMC Directive 2014/30/EU

Transmitter

Power Requirements	DC	Class II power supply is required; 9…28V DC @ 5 W maximum
	Protection	Reverse polarity and transient suppression
Display	Keypad	4-button navigation, membrane keypad with domed tactile feedback
	Resolution	128 × 64 pixel LED backlit graphical display; adjustable brightness and timeout
Enclosure	IP66; polycarbonate	
Ambient Temperature	Operational ambient	With display: –4…140° F (–20…60° C); without display: –40…158° F (–40…70° C)
	Storage	–40…176° F (–40…80° C)
Units of Measure	Velocity	feet/second, meters/second
	Totals	US Gallons, Million Gallons, Imperial Gallons, Million Imperial Gallons, Acre-Feet, Barrels, Liters, Hectoliters, Cubic Meters, Cubic Feet
	Flow rate	Acre Feet/Day, Liters/Second, Liters/Minute, Liters/Hour, Cubic Meters/Second, Cubic Meters/Minute, Cubic Meters/Hour, Cubic Feet/Minute, Cubic Feet/Minute, Cubic Feet/Hour, Gallons/Second, Gallons/Minute, Gallons/Hour, Million Gallons/Day, Imperial Gallons/Second, Imperial Gallons/Minute, Imperial Gallons/Hour, Barrel/Minute, Million Imperial Gallons/Day, Barrel/Day
Mounting	Wall or pipe remote mount or integral mount; Enclosure can be rotated in 90° increments	
Inputs	Digital input	5…30V DC, externally or internally sourced; totalizer reset or alarm unlatch
Outputs	Pulse / Frequency / Digital /	Two outputs, each selectable as frequency, pulse, forward/reverse flow or alarm output; isolated open collector, 5…30V DC, externally or internally sourced with pullup resistor Digital alarm output: configurable high or low Frequency output: 0.5 Hz…16 kHz maximum Pulse (totalizer) output: 5 kHz maximum output open collector, pulse width 5…500 ms programmable
	Analog Output	0…20 mA and 4…20 mA drive up to 800 Ohms; minimum 16-bit resolution, isolated
Networks	EIA-485 with selectable protocols	Modbus RTU, baud rates 9600, 19200, 38400, 57600, 76800, 115200 BACnet MS/TP, baud rates 9600, 19200, 38400, 57600, 76800, 115200
	Endpoints	Connectivity to AquaCUE or BEACON cellular endpoints
Configuration Port	USB, Type mini-B	
Alarms	Buffer previous alarms, warnings or errors	
Languages	English, French, German and Spanish selectable	
Security	Four levels: Read-only, Operator, Service and Admin; 6-digit passcode number; selectable auto logout	

Transducers

Model	Construction	Cable Length	Pipe/Tubing Sizes	Pipe/Tubing Materials	Protection
DTTC	CPVC, Ultem, Nylon cord grip Polyethylene cable jacket; –40…194° F (–40…90° C)*	100 ft (90 m) max.	0.5…2 in. (12…50 mm)	Carbon steel, stainless steel, copper and plastic	NEMA 6/IP67
DTTR	PBT glass filled, Ultem®, Nylon cord grip PVC cable jacket; –40…250° F (–40…121° C)	300 ft (90 m) max.	2…10 in. (DN50…DN250)		NEMA 6/IP67
DTTN	CPVC, Ultem, Nylon cord grip Polyethylene cable jacket; –40…194° F (–40…90° C)	300 ft (90 m) max.	2…10 in. (DN50…DN250)		NEMA 6/IP67
DTTN Submersible	CPVC, Ultem, Nylon cord grip Polyethylene cable jacket; –40…194° F (–40…90° C)	300 ft (90 m) max.	2…10 in. (DN50…DN250)		NEMA 6P/IP68
Easy Rail (DTTJ/K)	PBT glass filled, Ultem®, Nylon cord grip PVC cable jacket; –40…250° F (–40…121° C)	100 ft (30 m) max.	2…6 in. (DN50…DN150) 2…10 in. (DN50…DN250)		NEMA 6/IP67

* DTTC integral mount temperature is limited by the transmitter temperature rating

Configuration Software

The flow meter can be programmed and configured with the SoloCUE Flow Device Manager software. The software also has troubleshooting tools for diagnosing and correcting installation problems.

SoloCUE	Used to configure and troubleshoot flow meter. Software is compatible with Windows® 7 SP1 or newer

Figure 1: SoloCUE setup screen

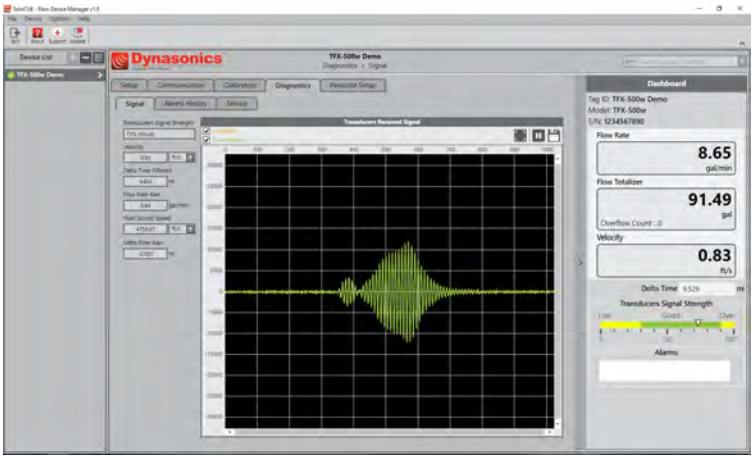


Figure 1: SoloCUE diagnostics screeen

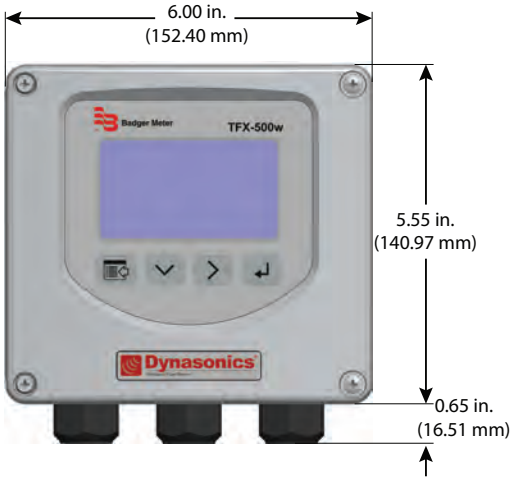
Additional Parts Required for Configuration

Part Number	Description
RC820648	USB Type A to mini B software cable (shielded to minimize noise)

DIMENSIONS

TFX-500w Meter

Enclosure, Integral and Remote, Front View



Integral Enclosure Side View

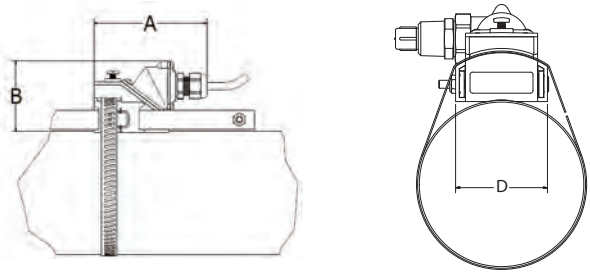
Remote Enclosure Side View

Transducers

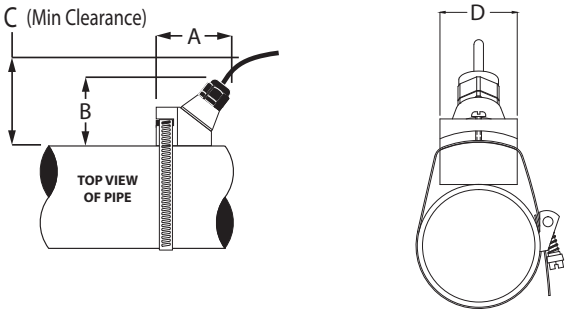
Remote System with Large Pipes

DTTR/DTTN

DTTR

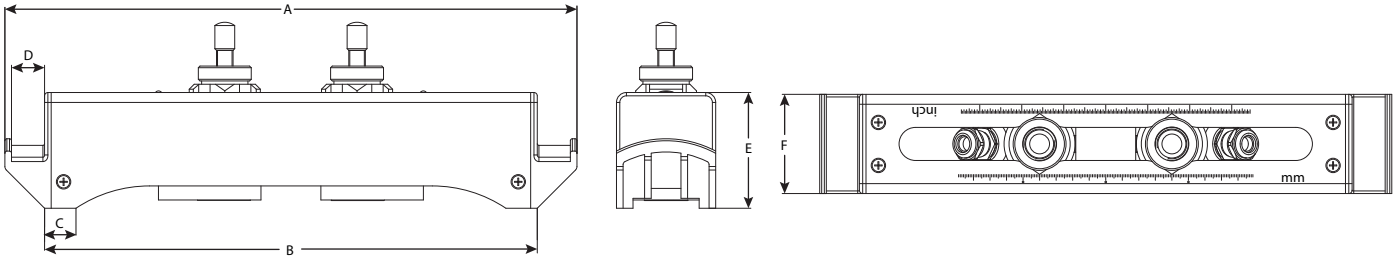


DTTN



Model	A	B	C	D
DTTR	3.75 in. (95.25 mm)	2.35 in. (59.69 mm)	—	2.19 in. (55.63 mm)
DTTN	2.95 in. (74.93 mm)	2.75 in. (69.8 mm)	3.00 in. (76.2 mm)	1.70 in. (43.2 mm)

DTTJ/DTTK

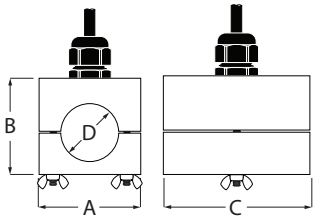


Model	A	B	C	D	E	F
DTTJ	13.62 in. (345.95 mm)	11.73 in. (297.94 mm)	0.75 in. (19.05 mm)	0.79 in. (20.06 mm)	2.76 in. (70.10 mm)	2.36 in. (59.94 mm)
DTTK	19.92 in. (505.97 mm)	18.03 in. (457.96 mm)	0.75 in. (19.05 mm)	0.79 in. (20.06 mm)	2.76 in. (70.10 mm)	2.36 in. (59.94 mm)

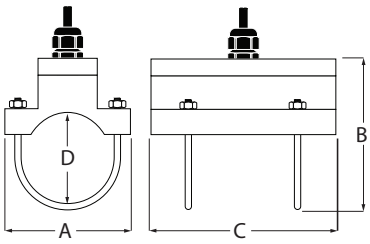
Remote System with Small Pipes

DTTC

DTTC
Pipes and Tubing
1/2…2 in. (12…50 mm)



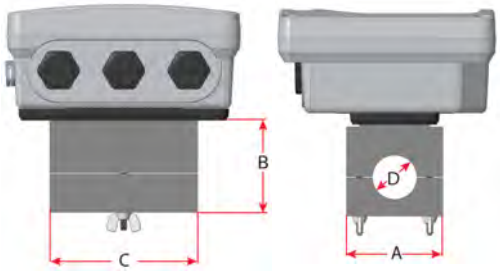
DTTC U-Bolt Connections
ANSI/DS and Copper
2 in. (50 mm) Models



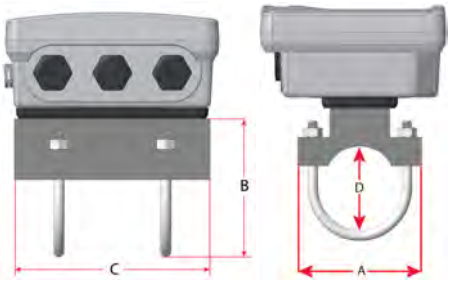
Integral System

DTTC

DTTC



DTTC U-Bolt Connections



Pipe Size	Pipe Material	A	B	C	D
1/2 in.	ANSI/DN	2.46 in. (62.48 mm)	2.36 in. (59.94 mm)	2.66 in. (67.56 mm)	0.84 in. (21.34 mm)
	Copper	2.46 in. (62.48 mm)	2.36 in. (59.94 mm)	3.33 in. (84.58 mm)	0.63 in. (16.00 mm)
	Tubing	2.46 in. (62.48 mm)	2.28 in. (57.91 mm)	3.72 in. (94.49 mm)	0.50 in. (12.70 mm)
3/4 in.	ANSI/DN	2.46 in. (62.48 mm)	2.57 in. (65.28 mm)	2.66 in. (67.56 mm)	1.05 in. (26.67 mm)
	Copper	2.46 in. (62.48 mm)	2.50 in. (63.50 mm)	3.56 in. (90.42 mm)	0.88 in. (22.35 mm)
	Tubing	2.46 in. (62.48 mm)	2.50 in. (63.50 mm)	3.56 in. (90.42 mm)	0.75 in. (19.05 mm)
1 in.	ANSI/DN	2.46 in. (62.48 mm)	2.92 in. (74.17 mm)	2.86 in. (72.64 mm)	1.32 in. (33.53 mm)
	Copper	2.46 in. (62.48 mm)	2.87 in. (72.90 mm)	3.80 in. (96.52 mm)	1.13 in. (28.70 mm)
	Tubing	2.46 in. (62.48 mm)	2.75 in. (69.85 mm)	3.80 in. (96.52 mm)	1.00 in. (25.40 mm)
1-1/4 in.	ANSI/DN	2.80 in. (71.12 mm)	3.18 in. (80.77 mm)	3.14 in. (79.76 mm)	1.66 in. (42.16 mm)
	Copper	2.46 in. (62.48 mm)	3.00 in. (76.20 mm)	4.04 in. (102.62 mm)	1.38 in. (35.05 mm)
	Tubing	2.46 in. (62.48 mm)	3.00 in. (76.20 mm)	4.04 in. (102.62 mm)	1.25 in. (31.75 mm)
1-1/2 in.	ANSI/DN	3.02 in. (76.71 mm)	3.40 in. (86.36 mm)	3.33 in. (84.58 mm)	1.90 in. (48.26 mm)
	Copper	2.71 in. (68.83 mm)	2.86 in. (72.64 mm)	4.28 in. (108.71 mm)	1.63 in. (41.40 mm)
	Tubing	2.71 in. (68.83 mm)	3.31 in. (84.07 mm)	4.28 in. (108.71 mm)	1.50 in. (38.10 mm)
2 in.	ANSI/DN	3.70 in. (93.98 mm)	3.42 in. (86.87 mm)*	5.50 in. (139.70 mm)	2.38 in. (60.45 mm)*
	Copper	3.70 in. (93.98 mm)	3.38 in. (85.85 mm)*	5.50 in. (139.70 mm)	2.13 in. (54.10 mm)*
	Tubing	3.21 in. (81.53 mm)	3.85 in. (97.79 mm)	4.75 in. (120.65 mm)	2.00 in. (50.80 mm)

* Varies due to U-bolt configuration

PART NUMBER CONSTRUCTION

DW - G - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - S - [ ] - [ ]

Transit Time: Pipes ≤ 2 in. (50 mm)

CERTIFICATION											
General Area, CE	G										
TRANSDUCER TYPE											
1/2 in. ANSI pipe		CA									
3/4 in. ANSI pipe		CB									
1 in. ANSI pipe		CC									
1-1/4 in. ANSI pipe		CD									
1-1/2 in. ANSI pipe		CE									
2 in. ANSI pipe		CF									
1/2 in. Copper Tube		CG									
3/4 in. Copper Tube		CH									
1 in. Copper Tube		CT									
1-1/4 in. Copper Tube		CJ									
1-1/2 in. Copper Tube		CK									
2 in. Copper Tube		CL									
1/2 in. Stainless Steel Tube		CM									
3/4 in. Stainless Steel Tube		CN									
1 in. Stainless Steel Tube		CP									
1-1/4 in. Stainless Steel Tube		CQ									
1-1/2 in. Stainless Steel Tube		CR									
2 in. Stainless Steel Tube		CS									
TRANSMITTER TYPE											
24V DC | Meter Mounted			E								
24V DC | Remoted Mounted			F								
DISPLAY											
Standard				S							
No display with keypad				W							
REMOTE CABLE LENGTH											
None (Meter Mounted)					WW						
15 ft (4.57 m)					AC						
30 ft (9.14 m)					AF						
50 ft (15.24 m)					AK						
75 ft (22.86 m)					AR						
100 ft (30.48 m)					BW						
CONDUIT TYPE AND LENGTH [1]											
None						WW					
15 ft (4.57 m)						AC					
30 ft (9.14 m)						AF					
50 ft (15.24 m)						AK					
75 ft (22.86 m)						AR					
100 ft (30.48 m)						BW					
RESERVED											
Standard							S				
UNITS OF MEASURE: TOTALIZER / FLOW RATE											
Gallons/gallons per minute								G			
Gallons/cubic feet per minute								B			
Cubic Meters/cubic meters per minute								T			
Cubic Meters/cubic meters per hour								H			
Cubic Feet/gallons per minute								F			
Cubic Feet/cubic feet per minute								J			
Liters/liters per second								N			
Liters/liters per minute								P			
Liters/liters per hour								Q			
Million Gallons/gallons per minute								M			
Acre Feet/gallons per minute								A			
TESTING & TAGGING											
Factory Calibrated											F
Factory Calibrated/ID Tag											S

[1] Conduit length must be less than or equal to cable length. Submersible Conduit limited to 100 ft (30 m).

DW	-	G	-		-	F	-		-		-		-	S	-		-	

Transit Time: Pipes ≥ 2 in. (50 mm)

CERTIFICATIONS	
General Area, CE	G
TRANSDUCER TYPE	
Easy Rail | 2 … 6 in. (50…150 mm) Pipes	JZ
Easy Rail | 6 … 10 in. (150… 300 mm) Pipes	KZ
DTTN | Medium Pipes	NZ
DTTN (Submersible) | Medium Pipes	WZ
DTTR | Medium Pipes	RZ
TRANSMITTER TYPE	
24V DC Remote Mounted	F
DISPLAY	
Standard	S
No display with keypad	W
REMOTE CABLE LENGTH	
15 ft (4.57 m)	AC
30 ft (9.14 m)	AF
50 ft (15.24 m)	AK
75 ft (22.86 m)	AR
100 ft (30.48 m)	BW
150 ft (45.72 m)	BK
200 ft (60.96 m)	DW
250 ft (76.20 m)	DK
300 ft (91.44 m)	EW
CONDUIT AND CABLE LENGTH [1]	
None	WW
15 ft (4.57 m)	AC
30 ft (9.14 m)	AF
50 ft (15.24 m)	AK
75 ft (22.86 m)	AR
100 ft (30.48 m)	BW
150 ft (45.72 m)	BK
200 ft (60.96 m)	DW
250 ft (76.20 m)	DK
300 ft (91.44 m)	EW
RESERVED	
Standard	S
UNITS OF MEASURE: TOTALIZER / FLOW RATE	
Gallons/gallons per minute	G
Gallons/cubic feet per minute	B
Cubic Meters/cubic meters per minute	T
Cubic Meters/cubic meters per hour	H
Cubic Feet/gallons per minute	F
Cubic Feet/cubic feet per minute	J
Liters/liters per second	N
Liters/liters per minute	P
Liters/liters per hour	Q
Million Gallons/gallons per minute	M
Acre Feet/gallons per minute	A
TESTING & TAGGING	
Factory Calibrated	F
Factory Calibrated/ID Tag	S

[1] Conduit length must be less than or equal to cable length. Submersible Conduit limited to 100 ft (30 m).

Control. Manage. Optimize.

www.badgermeter.com

The Americas | Badger Meter | 4545 West Brown Deer Rd | PO Box 245036 | Milwaukee, WI 53224-9536 | 800-876-3837 | 414-355-0400
México | Badger Meter de las Americas, S.A. de C.V. | Pedro Luis Ogazón N°32 | Esq. Angelina N°24 | Colonia Guadalupe Inn | CP 01050 | México, DF | México | +52-55-5662-0882
Europe, Eastern Europe Branch Office (for Poland, Latvia, Lithuania, Estonia, Ukraine, Belarus) | Badger Meter Europe | ul. Korfantego 6 | 44-193 Knurów | Poland | +48-32-236-8787
Europe, Middle East and Africa | Badger Meter Europa GmbH | Nurtinger Str 76 | 72639 Neuffen | Germany | +49-7025-9208-0
Europe, Middle East Branch Office | Badger Meter Europe | PO Box 341442 | Dubai Silicon Oasis, Head Quarter Building, Wing C, Office #C209 | Dubai / UAE | +971-4-371 2503
Slovakia | Badger Meter Slovakia s.r.o. | Racianska 109/B | 831 02 Bratislava, Slovakia | +421-2-44 63 83 01
Asia Pacific | Badger Meter | 80 Marine Parade Rd | 21-06 Parkway Parade | Singapore 449269 | +65-63464836
Switzerland | Badger Meter Swiss AG | Mittelholzerstrasse 8 | 3006 Bern | Switzerland | +41-31-932 01 11