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. (DN250) or smaller. By clamping on the outside of the pipe, the ultrasonic meter installs without cutting or tapping the pipe, leading to significant cost savings.

FEATURES

- Cost-effective, 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 (BTL certification) over RS485 and BEACON®/AquaCUE® connectivity

BENEFITS

- Reduces installation costs, especially retrofits
  - ◊ Installs without cutting into the pipe
  - ◊ Eliminates flanges and pipe fittings
  - ◊ Eliminates draining and air purging
- Eliminates ingress or leak points in pipes
- No moving parts to maintain
- No pressure head loss

APPLICATION

The TFX-500w meter is well suited for building automation, water distribution 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.

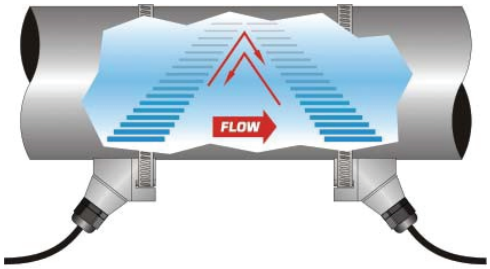
The TFX-500w meter is suitable for:

- Potable water
- Reclaimed water
- Chiller water
- Boiler feed water
- Make-up water

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-13 (December 2024)

Product Data Sheet

SPECIFICATIONS

System

Liquid Types	Water containing small amounts of suspended solids or gas bubbles	
Velocity Range	Up to 0.1…40 ft/s (0.03…12 m/s), depending on pipe and fluid, bidirectional	
Flow Accuracy	JZ, KZ, NZ, RZ, WZ UZ, CA-CT	> 2 in. (50 mm) ±1% of reading or ±0.01 ft/s (0.003 m/s), whichever is greater 1…2 in. (25…50 mm) ±1% of reading ±0.03 ft/s (0.01 m/s) 3/4 in. (20 mm) 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
Straight Run Requirements	10 diameters upstream, 5 diameters downstream from single elbow.	

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, 3.48k Ohm impedence, 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, 50 mA maximum, externally or internally sourced with pullup resistor Digital alarm output: configurable high or low Frequency output: 63 Hz…10 kHz maximum Pulse (totalizer) output: 100 Hz 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 [2, 3]
CA…CT, Fixed small pipe	CPVC, Ultem, Nylon cord grip Polyethylene cable jacket; –40…194° F (–40…90° C) [1]	100 ft (30 m) max.	0.5…2 in.
RZ (IP54), Standard pipe	PBT glass filled, Ultem®, Nylon cord grip PVC cable jacket; –40…250° F (–40…121° C)	300 ft (90 m) max.	2.5…10 in. (DN65…DN250)
NZ (IP67), Standard pipe	CPVC, Ultem, Nylon cord grip Polyethylene cable jacket; –40…194° F (–40…90° C)	300 ft (90 m) max.	2.5…10 in. (DN65…DN250)
WZ (IP68), Standard pipe, Submersible	CPVC, Ultem, Nylon cord grip Polyethylene cable jacket; –40…194° F (–40…90° C)	300 ft (90 m) max.	2.5…10 in. (DN65…DN250)
JZ, KZ (IP54), Standard pipe, Integrated rail	PBT glass filled, Ultem®, Nylon cord grip PVC cable jacket; –40…250° F (–40…121° C)	300 ft (90 m) max.	2.5…6 in. (DN65…DN150) 2.5…10 in. (DN65…DN250)
UZ Adjustable small pipe	CPVC, Ultem, and anodized aluminum track system; Nickel-plated brass connector with Teflon insulation; PVC cable jacket, –40…194° F (–40…90° C)	100 ft (30 m)	0.5…2 in. (15…50 mm)

[1] CA…CT integral mount temperature is limited by the transmitter temperature rating.
[2] Recommendations based on unlined, new pipes with water. Recommended pipe or tubing sizes vary with pipe conditions and fluid.
[3] PVC, CPVC, HDPE, PTFE, PDVF, stainless steel, ductile iron, aluminum, brass naval, carbon steel copper. Conduit not available with Easy Rail.

Configuration Software

The flow meter can be programmed and configured with the SoloCUE Flow Device Manager software for Windows®. The software also has troubleshooting tools for diagnosing and correcting installation problems. English, French, German, Italian and Spanish languages can be selected in the software.

SoloCUE	Used to configure and troubleshoot flow meter. Software is compatible with Windows® 8, 10, 11

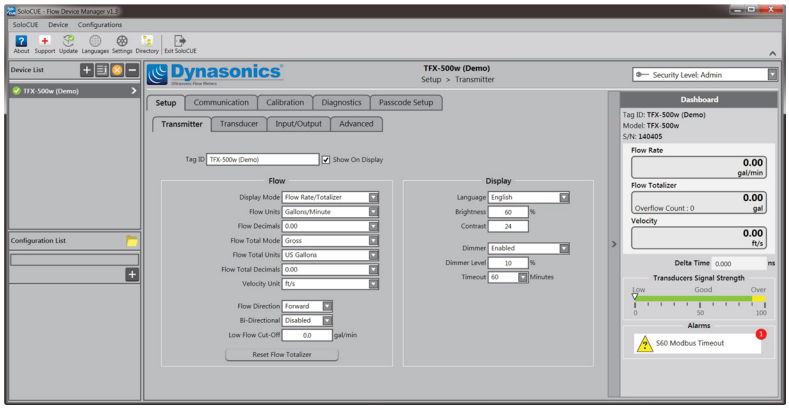


Figure 1: SoloCUE setup screen

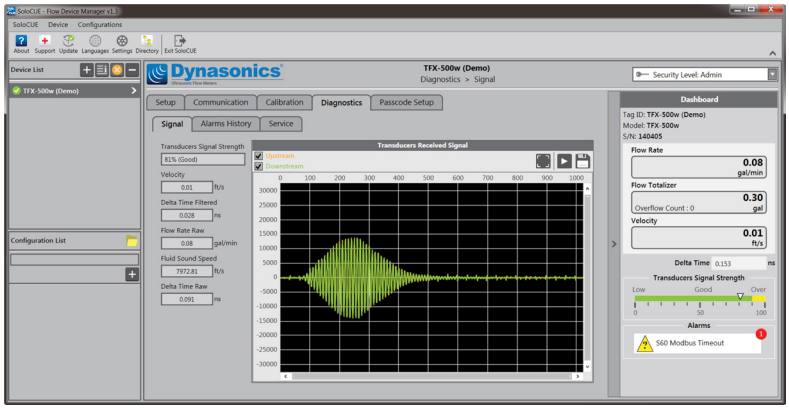


Figure 2: SoloCUE diagnostics screen

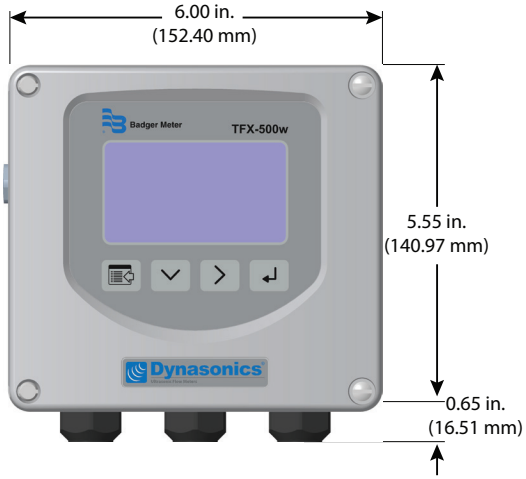
Additional Parts Required for Configuration

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

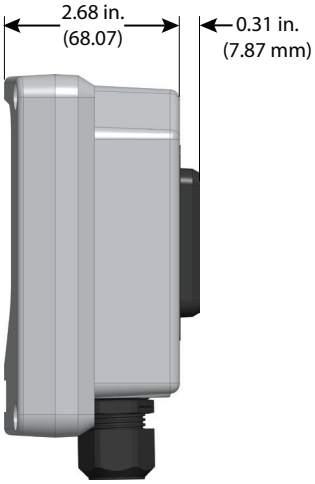
DIMENSIONS

TFX-500w Meter

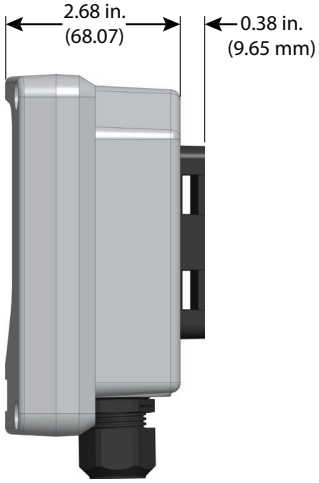
Enclosure, Integral and Remote, Front View



Integral Enclosure Side View



Remote Enclosure Side View

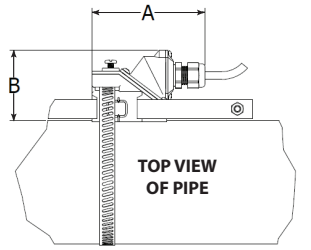


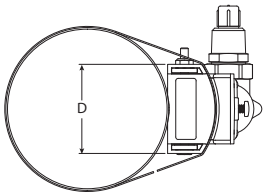
Transducers

Remote System with Standard Pipes

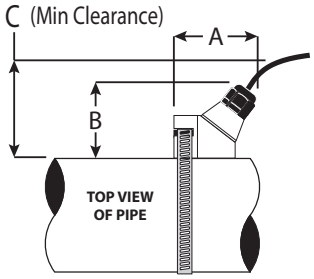
NZ/RZ/WZ (W, V or Z mount)

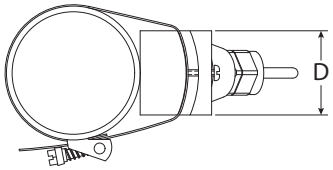
RZ (optional alignment rail)





NZ/WZ

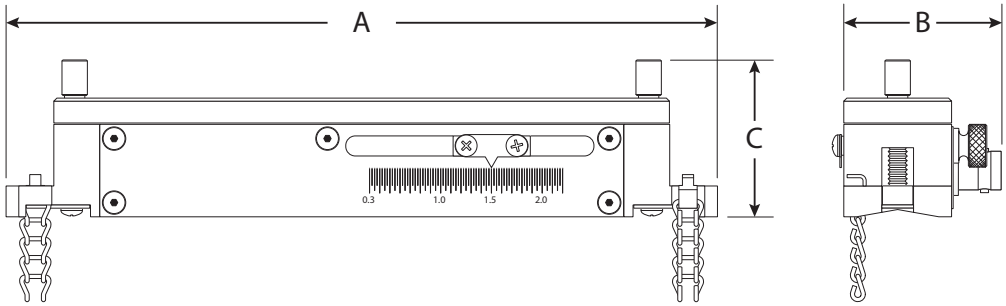




Model	A	B	C	D
RZ	3.75 in. (95.25 mm)	2.35 in. (59.69 mm)	—	2.19 in. (55.63 mm)
NZ, WZ	2.95 in. (74.93 mm)	2.75 in. (69.8 mm)	3.00 in. (76.2 mm)	1.70 in. (43.2 mm)

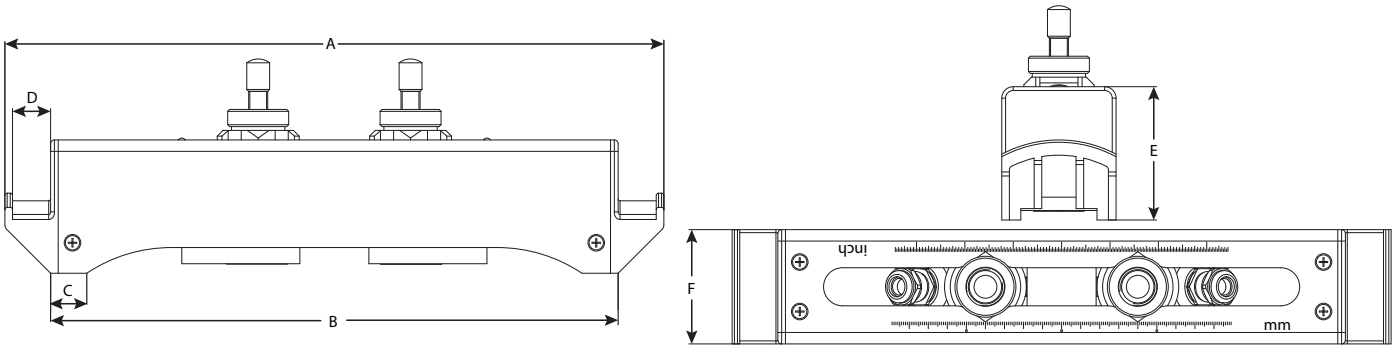
UZ (W or V mount)

Adjustable Small Pipe



Model	A	B	C	D	E	F
UZ	7 in. (178 mm)	1.6 in. (42 mm)	1.5 in. (39 mm)	—	—	—

Easy Rail JZ/KZ (W or V mount)

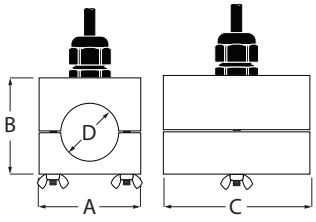


Model	A	B	C	D	E	F
JZ	13.62 in. (345.95 mm)	11.73 in. (297.94 mm)	0.75 in. (19.05 mm)	0.79 in. (20.06 mm)	2.76 in. (70.10 mm)	2.36 in. (59.94 mm)
KZ	19.92 in. (505.97 mm)	18.03 in. (457.96 mm)	0.75 in. (19.05 mm)	0.79 in. (20.06 mm)	2.76 in. (70.10 mm)	2.36 in. (59.94 mm)

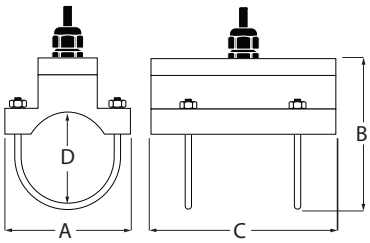
Remote System with Fixed Size for US/Canada Small Pipes

CA…CT

CA…CT (except CF and CL)
Pipes and Tubing
1/2…2 in.



CF and CL U-Bolt Connections
ANSI Pipe and Copper Tubing
2 in. Models



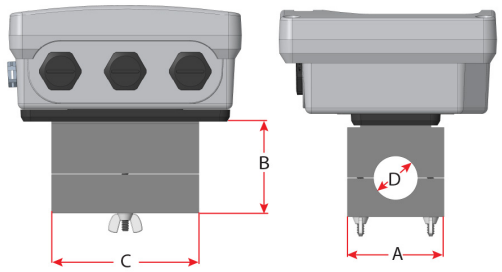
Flow Rates

I.D. (in.)	Max. Flow Rate	
	GPM	LPM
1/2	24	91
3/4	55	208
1	95	360
1-1/4	125	473
1-1/2	150	568
2	210	795

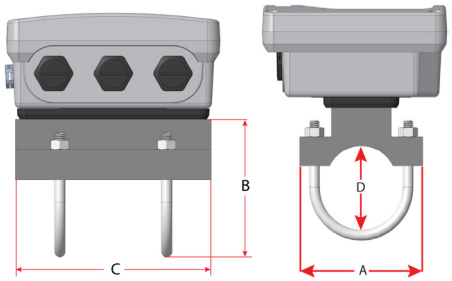
Integral System

CA…CT

CA…CT (except CF and CL)



CF and CL 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

NOTE: For remote transducers, allow for 3 in. for cable gland and bending radius of the cable.

PART NUMBER CONSTRUCTION

DW	-	G	-		-		-		-		-		-	XX	-		-	

Fixed Size for US/Canada Small Pipes

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														XX				
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). Conduit not available with Easy Rail.

Univeral Transducers										
TRANSDUCER TYPE										
Small Rail | (15…50 mm) Pipes [1]	UZ									
Easy Rail | 2.5…6 in. (65…150 mm) Pipes	JZ									
Easy Rail | 2.5…10 in. (65…250 mm) Pipes	KZ									
Standard 194° F (90° C) Max. | 2.5…10 in. (65…250 mm) Pipes	NZ									
Submersible | 2.5…10 in. (65…250 mm) Pipes	WZ									
Standard 250° F (121° C) Max. | 2.5…10 in. (65…250 mm) Pipes Alignment Rail Ready	RZ									
TRANSMITTER TYPE										
24V DC Remote Mounted for 2.5 in. (65 mm) and Larger Pipes		F								
24V DC Remote Mounted for Small Rail Transducer		G								
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 [2]										
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						XX				
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] Small Rail limited to 100 ft (30.48 m) cables or shorter.

[2] Conduit length must be less than or equal to cable length. Submersible Conduit limited to 100 ft (30 m). Conduit not available with Easy Rail or Small Rail.

PARTS AND ACCESSORIES

Couplant

Part Number	Description
D002-2011-001	Dow Corning® Molykote® 111 Grease; 5.3 oz Tube; 150° F (65° C)
D002-2011-002	Dow Corning 732; Permanent Mount; 356° F (180° C)

Dow 111 grease is included with transducers.

Power Supplies

Part Number	Description
68334-001	Wall Plug; 100…264V AC In; 24V DC Out; –20…50° C
68334-002	Module; 85…264V AC In; 24V DC Out; –30…70° C

For ordering transducers and transmitter separately, please contact factory.

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Control. Manage. Optimize.

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