



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.

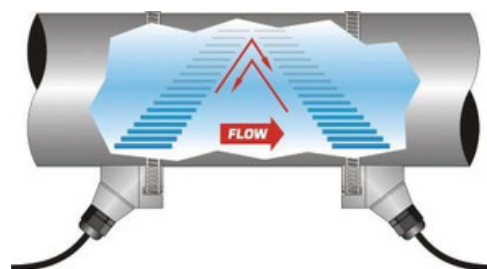
The TFX-500w meter is suitable for:

- 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.





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, ±0.2% of reading	> 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	Clamp-on ultrasonics	
Transducer Type	Remote mount transmitter and integral mount transmitter with transducers	
Certifications	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 impedance, 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
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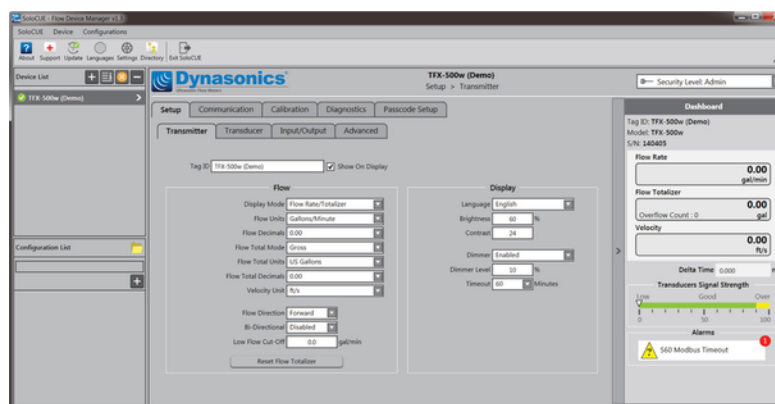


Figure 1: SoloCUE setup screen

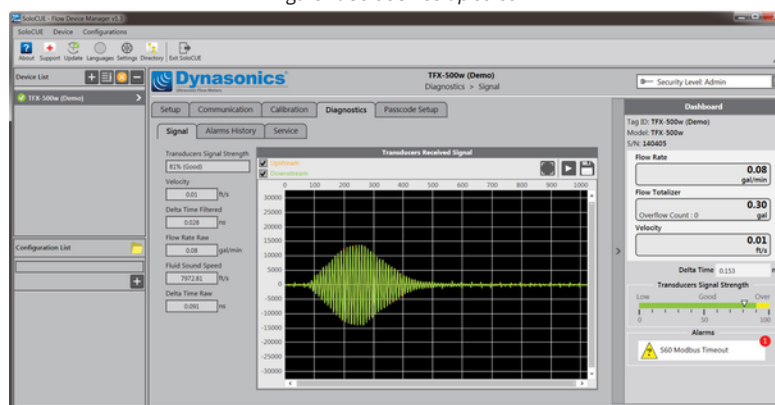


Figure 2: SoloCUE diagnostics screen

Additional Parts Required for Configuration

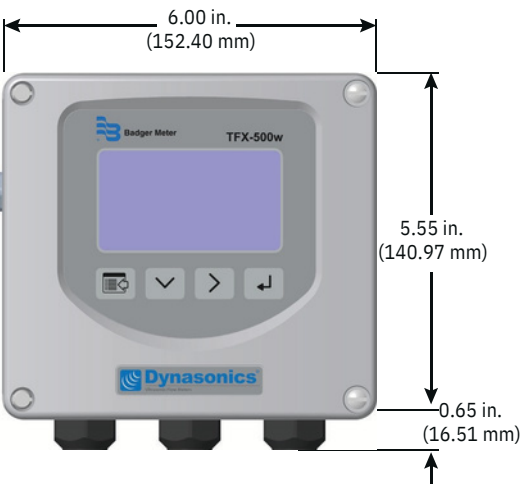
Part Number	Description
RC820648	USB Type A to mini B software cable (shielded to minimize noise)



DIMENSIONS

TFX-500w Meter

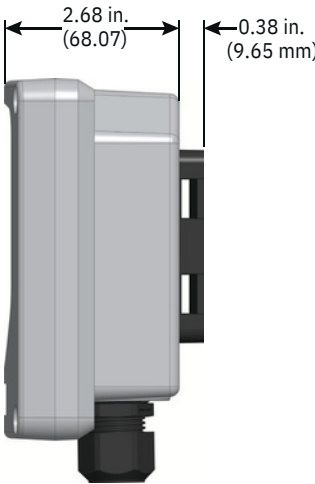
Enclosure, Integral and Remote, Front View



Integral Enclosure Side View



Remote Enclosure Side View



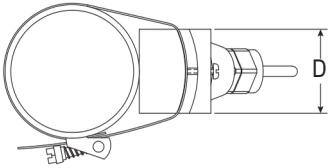
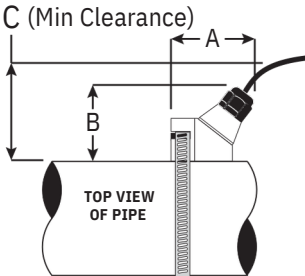
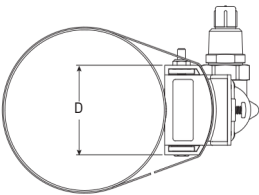
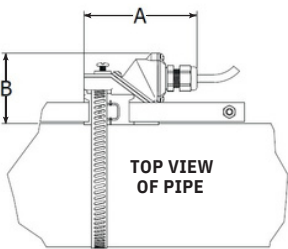
Transducers

Remote System with Standard Pipes

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

RZ (optional alignment rail)

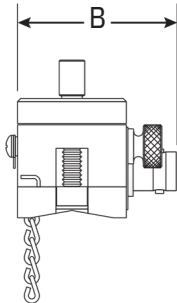
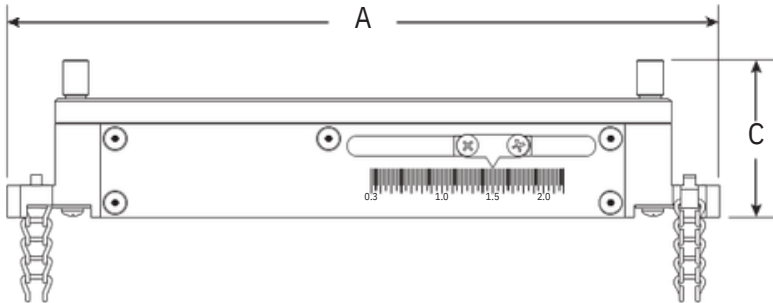
NZ/WZ



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)

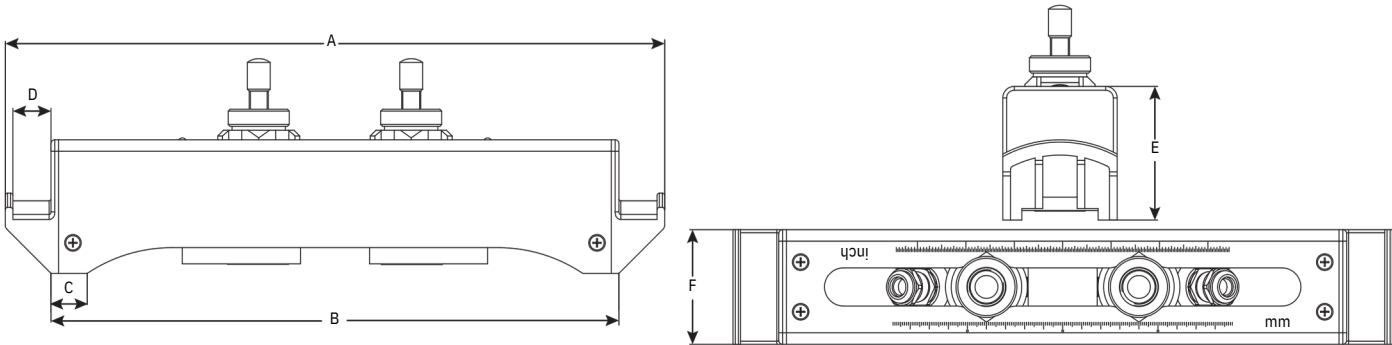
Adjustable Small Pipe



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)



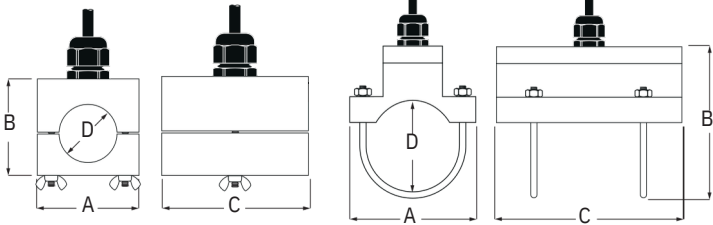
Model	A	B	C	D	E	F
JZ	13.62 in. (345.95 mm)	11.73 in. (297.94 mm)	0.75 in. (19.05 mm)	0.79 in. (20.06 mm)	2.76 in. (70.10 mm)	2.36 in. (59.94 mm)
KZ	19.92 in. (505.97 mm)	18.03 in. (457.96 mm)	0.75 in. (19.05 mm)	0.79 in. (20.06 mm)	2.76 in. (70.10 mm)	2.36 in. (59.94 mm)

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

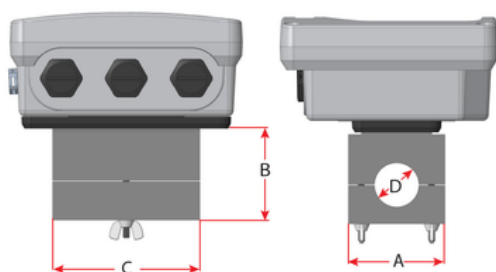
I.D. (in.)	Max. Flow Rate	
	GPM	LPM
1/2	24	91
3/4	55	208
1	95	360
1-1/4	125	473
1-1/2	150	568
2	210	795



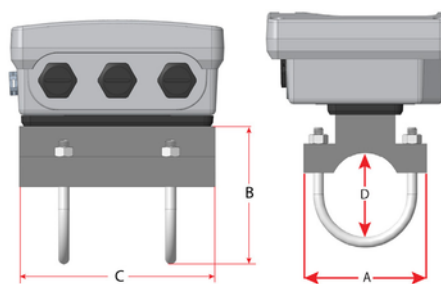
Integral System

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

Fixed Size for US/Canada Small Pipes									
DW G XX									
CERTIFICATION									
General Area, CE									
TRANSDUCER TYPE									
1/2 in. ANSI pipe									
3/4 in. ANSI pipe									
1 in. ANSI pipe									
1-1/4 in. ANSI pipe									
1-1/2 in. ANSI pipe									
2 in. ANSI pipe									
1/2 in. Copper Tube									
3/4 in. Copper Tube									
1 in. Copper Tube									
1-1/4 in. Copper Tube									
1-1/2 in. Copper Tube									
2 in. Copper Tube									
1/2 in. Stainless Steel Tube									
3/4 in. Stainless Steel Tube									
1 in. Stainless Steel Tube									
1-1/4 in. Stainless Steel Tube									
1-1/2 in. Stainless Steel Tube									
2 in. Stainless Steel Tube									
TRANSMITTER TYPE									
24V DC Meter Mounted									
24V DC Remoted Mounted									
DISPLAY									
Standard									
No display with keypad									
REMOTE CABLE LENGTH									
None (Meter Mounted)									
15 ft (4.57 m)									
30 ft (9.14 m)									
50 ft (15.24 m)									
75 ft (22.86 m)									
100 ft (30.48 m)									
CONDUIT TYPE AND LENGTH¹									
None									
15 ft (4.57 m)									
30 ft (9.14 m)									
50 ft (15.24 m)									
75 ft (22.86 m)									
100 ft (30.48 m)									
RESERVED									
Standard									
UNITS OF MEASURE: TOTALIZER / FLOW RATE									
Gallons/gallons per minute									
Gallons/cubic feet per minute									
Cubic Meters/cubic meters per minute									
Cubic Meters/cubic meters per hour									
Cubic Feet/gallons per minute									
Cubic Feet/cubic feet per minute									
Liters/liters per second									
Liters/liters per minute									
Liters/liters per hour									
Million Gallons/gallons per minute									
Acre Feet/gallons per minute									
TESTING & TAGGING									
Factory Calibrated									
Factory Calibrated/ID Tag									

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) Pipes1UZ
 Easy Rail | 2.5...6 in. (65...150 mm) Pipes JZ
 Easy Rail | 2.5...10 in. (65...250 mm) PipesKZ
 Standard 194° F (90° C) Max. | 2.5...10 in. (65...250 mm) PipesNZ
 Submersible | 2.5...10 in. (65...250 mm) PipesWZ
 Standard 250° F (121° C) Max. | 2.5...10 in. (65...250m) Pipes Alignment Rail ReadyRZ

TRANSMITTER TYPE

24V DC Remote Mounted for 2.5 in. (65 mm) and Larger Pipes
 24V DC Remote Mounted for Small Rail Transducer

F
G

DISPLAY

Standard
 Nodisplay with keypad

S
W

REMOTE CABLE LENGTH

15 ft (4.57 m)
 30 ft (9.14 m)
 50 ft (15.24 m)
 75 ft (22.86 m)
 100 ft (30.48 m)
 150 ft (45.72 m)
 200 ft (60.96 m)
 250 ft (76.20 m)

AC
AF
AK
AR
BW
BK
DW
DK
EW

CONDUIT AND CABLE LENGTH²

None
 15 ft (4.57 m)
 30 ft (9.14 m)
 50 ft (15.24 m)
 75 ft (22.86 m)
 100 ft (30.48 m)
 150 ft (45.72 m)
 200 ft (60.96 m)
 250 ft (76.20 m)

WW
AC
AF
AK
AR
BW
BK
DW
DK
EW

RESERVED

Standard

XX

UNITS OF MEASURE: TOTALIZER / FLOW RATE

Gallons/gallonsper minute
 Gallons/cubic feet per minute
 Cubic Meters/cubic meters per minute
 Cubic Meters/cubic meters per hour
 Cubic Feet/gallons per minute
 Cubic Feet/cubic feet per minute
 Liters/liters per second
 Liters/liters per minute
 Liters/liters per hour
 Million Gallons/gallons per minute
 Acre Feet/gallons per minute

G
B
T
H
F
J
N
P
Q
M
A

TESTING & TAGGING

Factory Calibrated
 Factory Calibrated/ID Tag

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

2011-002
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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 www.ingframex.com