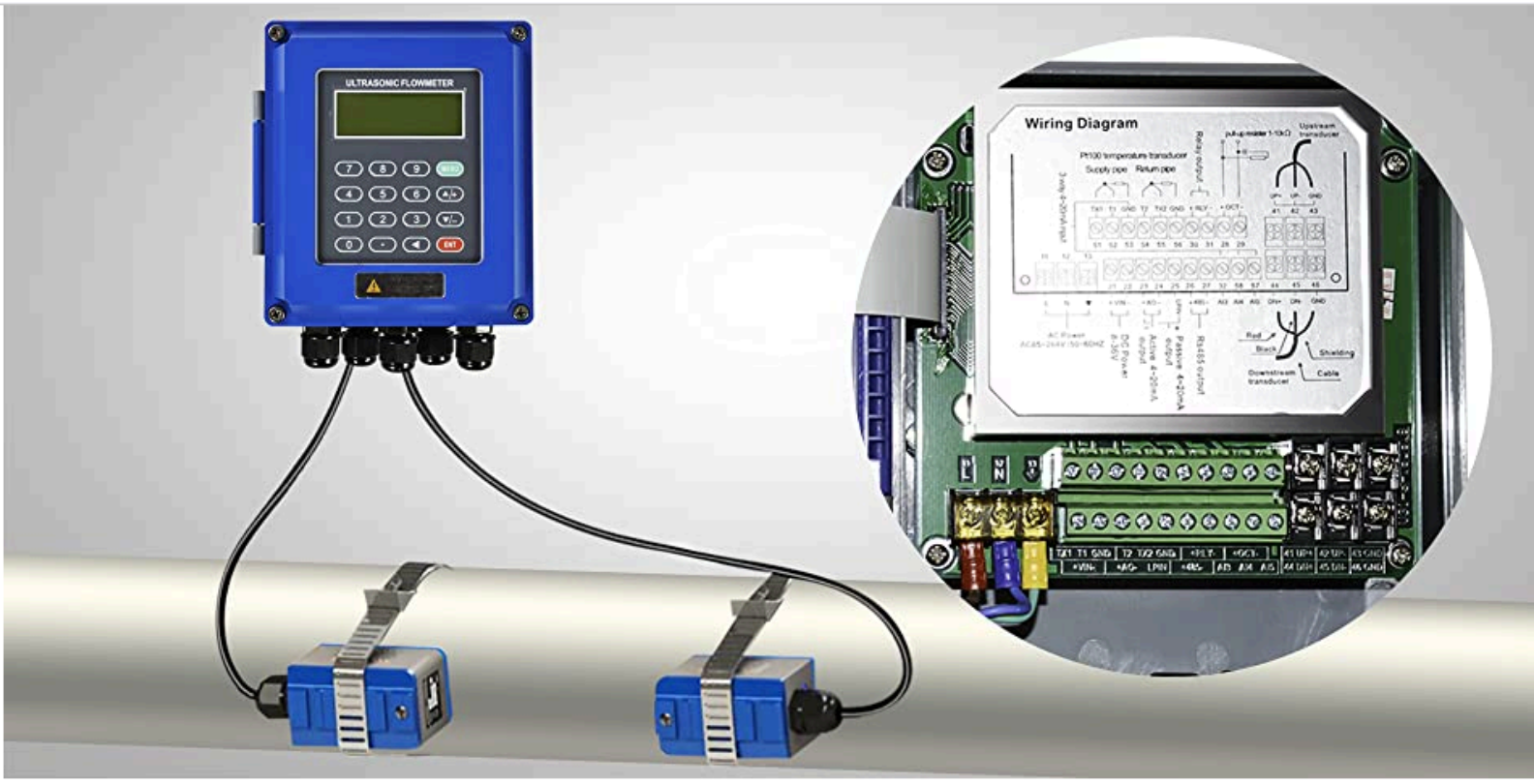
Quick Start Guide

Compu-Flow® Fixed Transit Time Ultrasonic Flowmeter Model TDS-200-F2

www.compuflowmeters.com



Advantage:

Ultrasonic flowmeter is a kind of non-contact instrument, which can be used to measure not only the flow of medium with large pipe diameter but als the measurement of medium that is not easy to be touched and observed.

Its measurement accuracy is very high, almost not subject to the various parameters of the measured medium interference, especially can solve other instruments can not strong corrosive, non-conductive, radioactive and flammable and explosive medium flow measurement problems.

Specification:

- Residual Errors: ±1%
- Velocity range: 0~±10m/s, Bi-directional measurement
- Pipe size: DN50~DN700mm
- Temperature: -30~90°C
- Type of liquid: Single liquid can transmit ultrasound, such as water, sea water, sewage, oil, alcohol, etc.
- Pipe material: Steel, stainless steel, cast iron, copper, PVC, aluminmum, glass steel, etc. Liner is allowed.
- Signal output: 1 way 4-20mA output; 1 way OCT pulse output; 1 way Relay output.
- Signal input: 3 way 4-20mA input, achieve to heat measurement by connecting PT100 platinum resistor.
- Interface: RS485, support MODBUS
- Data storage: SD card regularly store the pre-set results(not included)
- Power supply: DC8~36V or AC85~264V
- Package size: 40×26×17cm
- Gross weight: 2kg

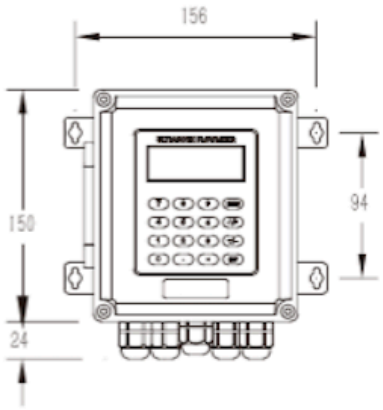
Package Include:

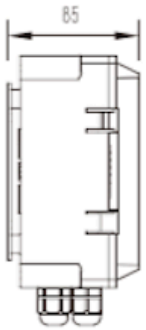
- 1 x TUF-2000B Ultrasonic Flowmeter
- 2 x T/M-1 Ultrasonic Transducer
- 2 x Clamp Fixure
- 1 x 10 meters Flow Signal Cable
- 1 x Accessory
- 1 x English Manual

Key Feature

Technical Data

Accuracy	1%
Velocity Range	0~±7m/s
Fluid Type	Single liquid like water, waste water
Pipe Material	Carbon steel, stainless steel, iron, copper, PVC
Power Supply	AC 85~264V; DC 8~36V
Output	4-20mA analog, OCT pulse, Relay output
Input	4-20mA analog input(3 way)
Interface	RS485
Protocol	Modbus
Data Storage	SD Card (Optional)





unit:mm

2.6.Quick Guide for parameters setting

In order to get the correct transducer mounting distance(the distance between the front edges of both transducers), verify and set the following parameters;

(1) Pipe outer diameter (menu M11)
(2) Pipe wall thickness(menu M12)
Or Pipe inner diameter (menu M13)---only either one.
(3) Pipe material (menu M14)
(4) Liner (menu M16)
(5) Fluid type (menu M20)
(6) Transducer type (menu M23)
(7) Transducer mounting method type. (Please refer to transducer installing guide for detailed method selection) (menu M24)

When the parameters above are properly set, the correct transducer mounting distance is calculated and displayed in menu M25

(8) Solidifying parameters inputting in menu M26. ***(For this operation, please refer to window M26 on chapter 3. Window Menu Details.)***

ATTENTION!
It is strongly recommended to solidifying the parameters while making any small changes.

6. Windows Display Explanations

6.1. Windows Display Codes

Flow Totalizer Display	
00	Flow Rate/Net Totalizer
01	Flow Rate/Velocity
02	Flow Rate/POS Totalizer
03	Flow Rate/NEG Totalizer
04	Date Time/Flow Rate
08	System Error Codes
09	Net Flow Today
Initial Parameter setup	
11	Pipe Outer Diameter
12	Pipe Wall Thickness
14	Pipe Material
23	Transducer Type
24	Transducer Mounting Method
25	Transducer Spacing
26	Parameters Setups & Save
27	Cross-sectional Area
28	Holding with Poor Sig
29	Empty Pipe Setup
Flow Units Options	
30	Measurement Units
31	Flow Rate Units
32	Totalizer Units
33	Totalizer Multiplier
34	Net Totalizer
35	Pos Totalizer
36	NEG Totalizer
37	Totalizer Reset
38	Manual Totalizer
Setup Options	
40	Damping
41	Low Flow Cutoff Value
42	Set Static Zero
43	Reset Zero
44	Manual Zero Point
45	Scale Factor
46	Network identifying address code
47	System Lock
Input and output setup	
55	CL Mode Select
56	CL 4mA Output Value
57	CL 20mA Output Value
58	CL Check
59	CL Current Output
60	Date and Time
61	ESN
62	Serial Port Parameter
63	AI1 Value Range
64	AI2 Value Range
67	FO Frequency Range
68	Low FO Flow Rate
69	High FO Flow Rate
70	LCD Backlit Option
71	LCD Contrast
72	Working Timer
73	Alarm #1 Low Value
74	Alarm #1 High Value
75	Alarm #2 Low Value
76	Alarm #2 High Value
77	Beeper Setup
78	OCT Output Setup
79	Relay Output Setup
82	Date Totalizer
83	Automatic Correction
Calorimetry	
84	Energy Units Select
85	Temperature Select
86	Specific Heat Ratio Select
87	Energy Totalizer ON/OFF
88	Energy Multiplier
89	Reset Energy Totalizer
Diagnoses	
90	Signal Strength and Quality
91	TOM/TOS*100
92	Fluid Sound Velocity
93	Total Time and Delta
94	Reynolds Number and Factor
96	Communications Mode
Appendix	
∧0	Power ON/OFF time
∧1	Total Working Hours
∧2	Last Power Off Time
∧3	Last Flow Rate
∧4	ON/OFF Times
∨0	Hardware Adjusting Entry

NOTE: The other menu features are retained by manufacturers and the windows in gray background are optional functions.

Wall Mounted Ultrasonic Flowmeter---User Manual

1.8 Specifications

TRANSMITTER	
Accuracy	±1% of reading, plus ±0.006m/s(±0.02ft/s) in velocity
Repeatability	Better than 0.2%
Velocity range	±0.03~±105ft/s(±0.01~±30m/s),bi-directional
Measurement period	0.5S
keypad	4×4 tactile-feedback membrane keypad
Display	LCD with backlight,2×20 letters
Units	English(U.S.) or metric
Outputs	Analog output:4-20mA or 0-20mA current output. Impedance 0-1KΩ. Accuracy 0.1%
	Isolated OCT output: for frequency output (0~9,999Hz), alarm driver, or totalizer pulse output, ON/OFF control, etc.
	Relay output 1A@125VAC or 2A@30VDC. For ON/OFF control, alarm driver, totalizer output, etc.
	Sound alarm
Inputs	RTD interface (optional): two temperature channels that can accommodate two PT100 3-wire temperature sensors for thermal energy measurement. Analog input: one channel of 4-20mA input. Can be used for temperature, pressure or liquid level sensor
Data Logger	Optional SD data logger from 1G~8G.
Recording	Automatically record the following information: ●The positive/negative/net flow/heater totalizer data of the last 512days/128monts/10years ●The power-on time and corresponding flow rate of the last 30 power on and off events. Allow manual or automatic flow loss compensation.
Communication Interface	Isolated RS-485 with power surge protection. Support the MODBUS protocol. M-BUS and FUJI's extending flowmeter protocol.
Other function	Capable of offline compensation for flow totalizer, automatic/manual selectable. Self-diagnosis
Enclosure	Die-cast aluminum enclosure. Protection Class:IP65.(NEMA 4X).Weather-resisitant. Size:9.88"×7.56"×3.15"(251×192×80mm)
Weight	2.5kgs
Power supply	85-264VAC/8-36VDC
Temperature	-10℃~70℃
Humidity	85%RH
TRANSDUCER & CABLE	

Wall Mounted Ultrasonic Flowmeter---User Manual

Clamp-on type	Standard S1 for 1”~4”(DN25-DN100mm) Standard M1 for 2”~28”(DN50-DN700mm) Standard L1 for 11”~240”(DN300-DN6000mm) High temperature S1H for 1”~4”(DN25-DN100mm) High temperature M1H for 2”~28”(DN50-DN700mm)
Insertion wetted type	For 3”~240”(DN80-DN6000mm)
Flow-cell inline type	For DN15-DN1000mm
Protection Class	Transducers: IP68
Transducer temperature	Standard clamp-on type: 0℃~70℃ High temperature clamp-on type: 0℃~150℃ Insertion wetted type: 0℃~150℃ Flow-cell inline type: 0℃~150℃
Transducer cable	Shielded transducers. Standard length 15’(5m).Can be extended to 1640’(500m).Contact the manufacture for longer cable requirement. Cable should not be laid in parallel with high-voltage power lines, neither should it be close to strong interference source such as power transformers.
LIQUIDS	
Liquid Types	Virtually all commonly used clean liquids. Liquids with small quantity of tiny particles may also be applicable. Particle size should be less than 100um, particle concentration less than 20,000ppm or<2%. Liquid should contain no or very minor air bubbles.
Liquid Temperature	-40℃~155℃ depending on transducer type
Pipe	
Pipe size	DN25-DN6,000mm(0.5”~240”)
Pipe material	All metals, most plastics, fiber glass, etc. Allow pipe liner
Straight pipe section	15D in most cases, 30D if a pump is near upstream, where D is pipe diameter

Chapter 2.Installing and Measurement

2.1.Unpacking

Please unpacking the shipping box and check the parts and documents against the packing slip. If there is something missing, the device is damaged or something is abnormal, please contact us immediately and do not proceed with the installation.

1.3 Flow Measurement Principle

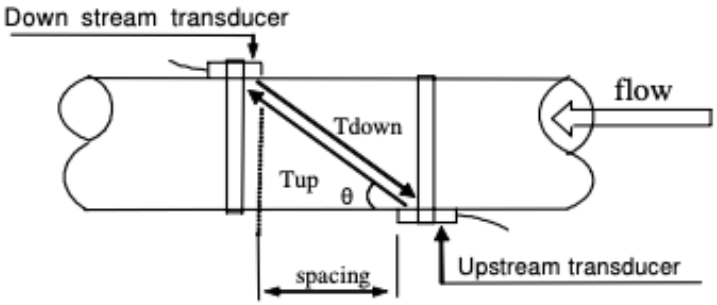
The Handheld unit ultrasonic flow meter is designed to measure the velocity of liquid within a closed conduit. It uses the well-know transit-time technology. The transducers are a non-contacting, clamp-on type. They do not block the flow, thus no pressure drop. They are easy to install and remove.

The flow meter unit utilizers a pair of transducers that function as both ultrasonic transmitter and receiver. The transducers are clamped on the outside of a closed pipe at a specific distance from each other. The transducers can be mounted in V-method where the sound transverses the pipe twice, or W-method where the sound transverses the pipe four times, or in Z-method where the transducers are mounted on opposite sides of the pipe and the sound crosses the pipe once. The selection of the mounting methods depends on pipe and liquid characteristics.

The handheld type flow meter operates by alternately transmitting and receiving a frequency-modulated burst of sound energy between the two transducers and measuring the transit time that it takes for sound to travel between the two transducers. The difference in the transit time measured is directly and exactly related to the velocity of the liquid in the pipe, as shown in the following figure.

FIGURE 1: TRANSIT TIME FLOW MEASUREMENT PRINCIPLE

$$V = \frac{MD}{\sin 2\theta} \times \frac{\Delta T}{T_{up} \bullet T_{down}}$$



Where

θ is the angle between the sound path and the flow direction
M is the number of times the sound traverses the flow
D is the pipe diameter
Tup is the time for the beam travelling from upstream the transducer to the downstream transducer
Tdown is the time for the beam travelling from the downstream transducer to the upstream transducer
ΔT = Tup – Tdown

Transducer installation steps

The installation of the ultrasonic flowmeter is the simplest one in all the flowmeters. Users only need to select an appropriate measurement point, input the parameters for the measurement point pipe to the flowmeter, and install the transducer to measure.

1. Select measurement point

2. Mark a horizontal line

3. Select a second point on the horizontal line using the transducer spacing displayed by the meter

4 Apply the coupling compound to the bottom of the transducers.

5. Place the transducers on the selected measurement points.

6. Fix the transducers with pipe straps.

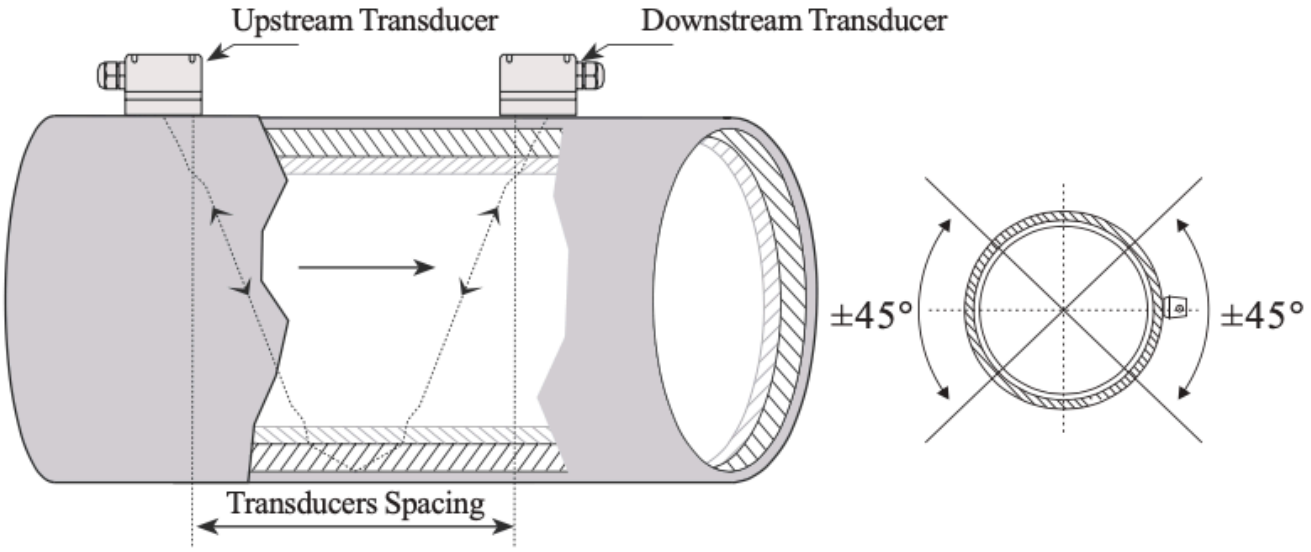
7. Transducer installation is done

Transducers installed

8. Apply the second one with the same way

	different with that in the flash memory, the system will store your current parameters into the flash memory and then boot again. By doing so, the parameters will NEVER get lost, even when both the power supply and the backup battery are removed.
M27	Entry to store to or restore from the internal Flash memory, as many as 9 different pipe parameter configurations To save or load the current setup parameter, use the going up or going down keys to change the address number, press 'ENT' key, and use going down or going up keys to select to save to or load from the memory.
M28	Entry to determine whether or not to hold (or to keep) the last good value when poor signal condition occurs. YES is the default setup.
M29	Entry to setup empty signal threshold. When the signal is less than this threshold, the pipe is regarded as empty pipe, and the flow meter will not totalize flow. This is based on the fact that, for most occasions, when pipe is empty, the transducer would still receive signal, just smaller than normal, As a result, The flow meter would show normal operation, which is not correct. Make sure that the entered value must be less than the normal signal strength. When much noisy signals are received, to make sure the flow meter will not incorrectly totalize flow, there is also a 'Q' threshold should be entered in M.5
M30	Window for selecting unit system. The conversion English to Metric or vice versa will not affect the unit for totalizers.
M31	Window for selecting flow rate unit system. Flow rate can be in 0. Cubic meter short for (m^3) 1. Liter (l) 2. USA gallon (gal) 3. Imperial Gallon (igl) 4. Million USA gallon (mgl) 5. Cubic feet (cf) 6. USA liquid barrel (bal) 7. Oil barrel (ob) The flow unit in terms of time can be per day, per hour, per minute or per second. So there are 32 different flow rate units in total for selection.
M32	Window for selecting the totalizers unit. Available units are the same as those in M31
M33	Window for setting the totalizer multiplying factor The multiplying factor ranges from 0.001 to 10000. Factory default is 1
M34	Turn on or turn off the NET totalizer
M35	Turn on or turn off the POS (positive) totalizer
M36	Turn on or turn off the NEG(negative) totalizer
137	(1) Totalizer reset (2) Restore the factory default settings parameters. Press the dot key followed by the backspace key. Attention, It is recommended to make note on the parameters before doing the restoration
138	Manual totalizer used for easier calibration. Press a key to start and press a key to stop the manual totalizer.
139	Interface Language selection.

V method is usually used on pipes from DN15 to DN200



Z-method is usually used on pipes from DN200 to DN600.

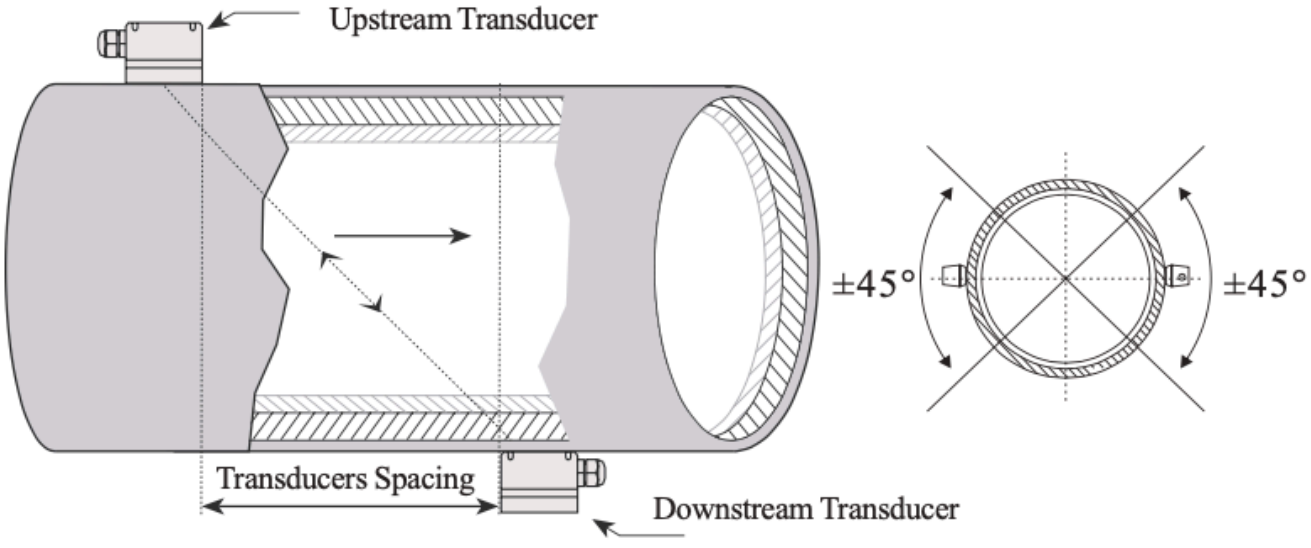


FIGURE 6: TRANSDUCER CLAMP DOWN

**Note: It is recommended to use the Conductive Gel product from Livingstone, as the ultrasonic couplant for safety considerations. Other couplants, such as grease, gel, and Vaseline, can be used as alternatives, but at your own risk.*

2.8.1 Transducer Spacing

The spacing value shown on menu window M25 refers to the distance of inner spacing between the two transducers (see the following figure). The actual distance of the two transducers should be as close as possible to this spacing value.

2.8.2 V Method Installation

V-method installation is the most widely used method for daily measurement with pipe inner diameters ranging from 20 millimetres to 300 millimetres. It is also called reflective method.

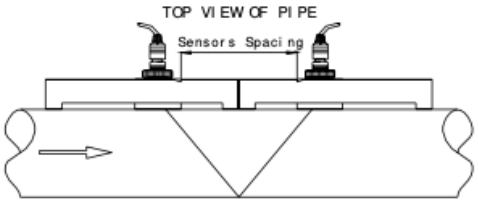


FIGURE 7: TRANSDUCER V METHOD MOUNTION

2.8.3 Z Method Installation

Z-method is commonly used when the pipe diameter is between 100 millimetres' and 500 millimetres.
This method is the most direct for signal transfer and can therefore provide better results than V method on many applications.

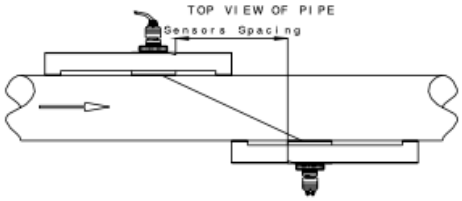


FIGURE 8: TRANSDUCER Z METHOD MOUNTING

2.8.4 W Method Installation

W-method is usually used on plastic pipes with a diameter from 10 millimetres to 100 millimetres.
This method can be effective on smaller pipes that have internal deposits.

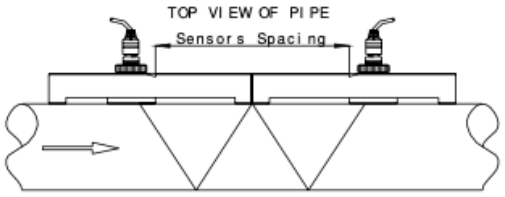


FIGURE 9: TRANSDUCER W METHOD MOUNTING