

SENSORFACT

Smart Monitoring **for the Industry**

ULTRASONIC WATERSENSOR INSTALLATION GUIDE



Why this document?



Ultrasonic water installation needs to happen quite diligently.



Improper installation leads to significantly distorted readings, or even no readings at all.



Sensorfact here to help and guide you throughout the procedure.



Installation steps

To ensure reliable data collection, it is crucial to determine the right distance between the transducers. In order to do so, we need information about each measurement location. This information is already collected by our customer onboarding team during the technical assessment. The information we need from you is as follows, with the corresponding menu in the main unit of the flow meter shown in brackets:

- Pipe Outer Diameter (M-11)
- Pipe Wall Thickness (M-12)
- Pipe Inner Diameter (M-13)
- Pipe Material (M-14)
- Sound Speed in Pipe Wall (M-15) (only needed if unknown pipe material)
- Fluid type (M-20)
- Requirement for temperature sensors (yes/no)
- Distance closest to a power outlet

This information is essential for configuring the sensors accurately and ensuring the highest data quality.

Important note: if you make any changes to the settings of the ultrasonic flow meter, do not forget to save the settings. On the main unit press **MENU** , **2** and **6** then **ENT** twice to Solidify Settings.

PART 1: INSTALLATION MATERIALS

Sensorfact will send you the following hardware and materials:

- Ultrasonic water meter
- Set of two ultrasonic transducers
- Silicone grease
- Power supply
- Wall mounting parts
- Metal worm gear clamps for the transducers and temperature sensors

If you've opted for the temperature add-on:

- A set of two temperature sensors
- Thermal paste

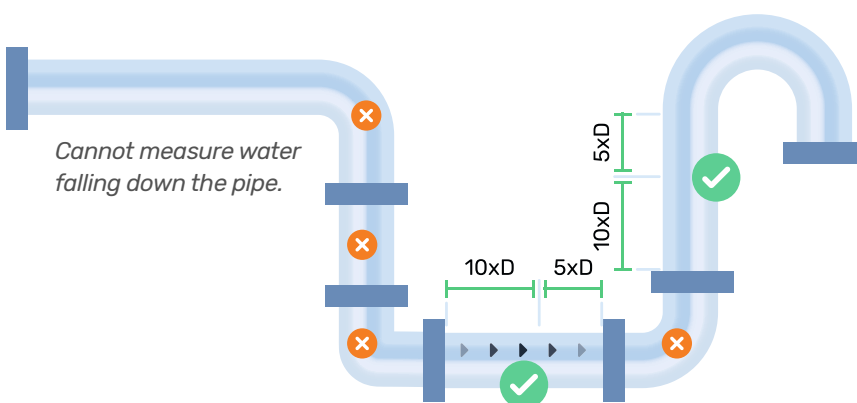
In addition to these materials provided, there are a few things you should have on hand yourself. These include rubber gloves, cleaning paper, a knife, sandpaper, a ruler or measuring tape and materials such as screws and dowels for fixing to the wall.

PART 2: MOUNTING AND INSTALLING ULTRASONIC SENSORS

Sensor location

The first step in the installation process is the selection of an optimal location. To ensure accurate measurements, the sensors need to be installed on a straight pipe section length that is completely filled with the liquid to be measured. Specifically, the location should meet the following requirements:

- Straight pipe length: The sensors should be installed on a straight section of the pipe with at least 15 times the pipe diameter of undisturbed length from any bends, valves, or pumps.
- Upstream transducer placement: Position the upstream transducer at a minimum distance of 10 times the pipe diameter from the nearest disturbance (e.g., bend, valve, pump).
- Downstream transducer placement: Position the downstream transducer at a minimum distance of 5 times the pipe diameter from the nearest disturbance.
- Sensor orientation: When following the flow of liquid in the pipe, the upstream sensor must be placed ahead of the downstream sensor. For vertical pipes, ensure the flow of liquid is upwards.



Mounting the main unit

In addition to finding the right location for placing the measurement points, it is also important to determine the location to mount the main box of the ultrasonic water meter. We recommend fixing it to a wall nearby the measurement location. A power socket is required to power the sensor.

Sensor location

The pipe must be prepared before installing the sensor:

- Remove any lining material.
- Clean the surface of the pipe thoroughly.
- Sand the surface to remove dust, paint, or any other residue.

PART 2-1: MOUNTING AND INSTALLING ULTRASONIC SENSORS

A. Prepare the Clamp

- Locate one of the metal worm gear clamps.
- Open the clamp and wrap it around the pipe. Screw it closed, leaving some space for the transducer.

B. Prepare the Transducer:

- Take the transducer labeled "UP." It should be installed on the pipe in the direction of the water flow.
- Apply a small amount of silicone grease to the transparent part of the transducer.

C. Place and Secure the Transducer:

- Position the transducer on the pipe and secure it with the metal worm gear clamp.

D. Additional Placement Considerations:

- Horizontal Pipe: Ensure the transducer is placed on the side of the pipe, 45 degrees down from horizontal, not on top of the pipe.

E. Prepare and Position the Second Transducer:

- Locate the second metal worm gear clamp.
- Position it on the pipe according to the distance specified in the technical assessment, found in the installation guide or Menu 25 on the flow meter.
- Screw the clamp closed, ensuring there is space for the transducer.

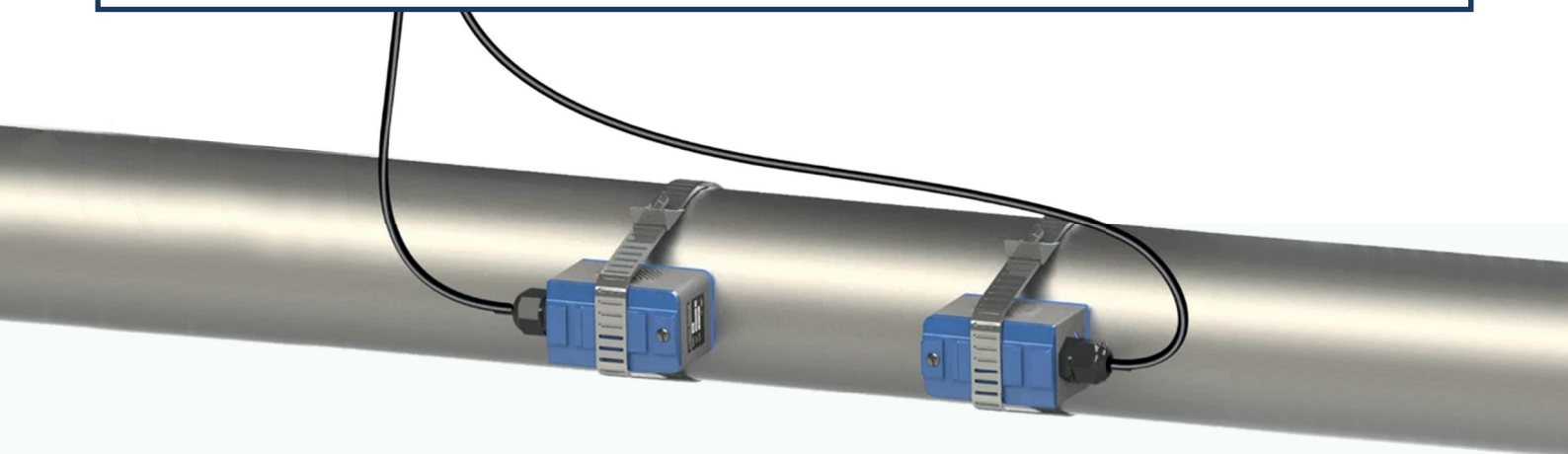
F. Install the DOWN Transducer:

- Take the transducer labeled "DOWN." Follow the same steps as for the UP transducer:
- Apply a small amount of silicone grease to the transparent part of the transducer.
- Place the transducer on the pipe and secure it with the metal worm gear clamp.
- Ensure it is aligned and facing the UP transducer with the correct distance between them.

G. Additional Placement Considerations:

- Connect the 'DOWN' transducer to the connector labeled 'DOWN' on the main housing.
- Connect the 'UP' transducer to the connector labeled 'UP' on the main housing.

Note: The accurate distance between the two transducers is crucial for correct sensor operation. Ensure they are properly aligned and spaced as per the technical specifications.



PART 3: VERIFY SUCCESSFUL INSTALLATION

Before completing the installation, please verify you successfully installed the sensors by following these steps:

1. Check error code:

- Access Menu M-01 on the main unit: Press **MENU**, **0**, and **1**, then **ENT**.
- Check the single letter in the top right corner. R* represents system normal. If any other single letter with asterisk is displayed, refer to the Appendix for interpretation of other indications.

2. Signal Strength and Quality

- Access the Strength and Quality window: Press **MENU**, **9**, and **0**, then **ENT**.
- Check the following important numbers:
 - UP / DN: Signal Strength (values should be between 60 - 99).
 - Q: Signal Quality (Q value should be between 70 - 99).
 - Ensure these values fall within the specified ranges for accurate readings.

3. Transit Time Ratio (TOM/TOS):

- Access the Transit Time Ratio window: Press **MENU**, **9**, and **1**, then **ENT**.
- Verify the TOM/TOS value displayed falls within the range of 97% - 103%.
- If below 97%, place the transducers slightly farther apart. If over 103%, place them slightly closer together.

4. Adjustment Guidelines

- If you need to adjust the transducers by more than 5 mm from the suggested spacing to achieve values within limits, contact your Onboarding Representative.
- Discuss the input parameters in Menu M-11, M-12, and M-14 for further guidance.



Do's and don'ts of installing ultrasonic water meters

DO'S

- Carefully read and follow the installation instructions.
- Carefully observe the mounting distance between the two transducers (as indicated in the technical assessment and Menu 25 on the flow meter).
- Properly clean and polish pipe surface before installation.
- Install on a pipe without inside corrosion.
- Apply enough couplant to ensure proper contact between the transducers and pipe.
- Allow a minimum of 10 diameters upstream of straight pipe and 5 diameters downstream of transducers for accurate measurements.

DONT'S

- Don't install on vibrating pipes.
- Don't install on non-pressurized pipes.
- Don't install on top of a horizontal pipe; always on the side.
- Don't install on vertical pipes where the water flows downwards.
- Don't mark an installation as 'done' if:
 - The 'Q' value in Menu 90 is below 70.
 - TOM/TOS value in Menu 91 is outside the 97% - 103% range.
 - Any letter other than 'R' appears in M08.

Resources available for you



Installation Video

A step-by-step explanation of the installation process has been shared with you.



Onboarding Team

Available to address inquiries and provide support throughout the installation process.



Installation Guide

This document: provides comprehensive details on installation procedures and best practices.



Troubleshooting Guide

Document to assist with any installation issues you may encounter. Please ask your Onboarding Representative if needed.

Appendix A: Error codes

Error Codes can be found as an asterisk and single letter in the lower right corner on the menu windows of M00, M01, M02, M03 and M08.

CODE	MESSAGE	CAUSES	SOLUTIONS
*R	System Normal	No error	
*I	No Signal	1) Unable to receive signals	(1) Adjust measuring location
		(2) Transducers installed incorrectly	(2) Reinstall the transducers following the instructions manual
		(3) Loose contact or not enough couplant between transducer and pipe outer urface.	(3) Make sure there is enough couplant
		(4) Pipe liners are too thick or the deposition inside of the pipe is too thick.	(4) Check the transducer cables
		(5) Transducer cables are not properly connected	
*J	Hardware Error	Hardware problem	Contact the manufacturer
*H	PoorSig Detected	(1) Poor signal detected	(1) Adjust measuring location
		(2) Transducers installed incorrectly	(2) Clean and polish pipe surface
		(3) Too much fouling (corrosion, deposition, etc.)	(3) Make sure there is enough couplant
		(4) The pipe liner is too thick	(4) Check the transducer cables
		(5) Problem with transducer cables	
*Q	Frequ OutputOver	The actual frequency for the Frequency Output is out of the range specified by the user	Check the values entered in window M66, M67, M68 and M69 and use a larger value in M69
*F	System RAM Error	(1) Temporary problems with RAM, RTC	(1) Turn on the power again
	Date Time Error	(2) Permanent problems with hardware	(2) Contact the manufacturer
	CPU or IRQ Error		
	ROM Parity Error		
*1, *2, *3	Adjusting Gain	Instrument is in the progress of adjusting the gain for the signal and the number indicates the progressive steps	No need for action
*K	Empty Pipe	No liquid inside the pipe, incorrect setup in M29	Relocate the meter to where the pipe is full of liquid enter 0 in M29

Appendix B: Menu overview

MENU #	DESCRIPTION
M00	Display flow rate and NET totalizer. If the the net totalizer is turned off, the net totalizer value shown on the screen is the value prior to its turn off . Select all totalizer unit in menu M31.
M01	Display flow rate, velocity.
M08	Displays all the detailed error codes. 'R' stands for normal.
M11	Window for entering the outer diameter of the pipe.
M12	Window for entering pipe wall thickness.
M14	Window for selecting pipe material. Standard pipe materials (no need to enter material sound speed) include: (0) carbon steel (1) stainless steel (2) cast iron (3) ductile iron (4) copper (5) PVC (6) aluminum (7) asbestos (8) fiberglass (9) other(need to enter material sound speed in M15).
M15	Window for entering the material sound speed, only for non-standard pipe materials.
M20	Window for selecting fluid type.
M21	Window for entering the the sound speed of non- standard liquid.
M22	Window for entering the viscosity of the non-standard liquids.
M23	Window for selecting transducer type: either Standard M or Standard S. Depends on pipe size.
M26	Function to store the current parameters into the flash memory, so that these parameters will be solidified and will be loaded as the default parameters every time when power is turned on.
M32	Window for selecting the totalizers unit. L or m3.
M41	Low flow rate (or zero flow rate) cut-off to avoid invalid accumulation.
M42	Zero calibration/Zero point setup. Make sure the liquid in the pipe is not running while doing the setup. Can be used to improve data accuracy.
M43	Clear the zero point value, and restore the solidified zero point value.
M45	Flow rate scale factor. The default value is '1'. Keep this value as '1', when no calibration has been made.
M79	If measuring fluid volume (no temperature sensors): Select POS Int Pulse. If measuring energy (with temperature sensors). Select Energy POS Pulse.
M90	Display signal strengths S (one for upstream and one for downstream), and signal quality Q value. Signal strength is presented by 00.0 to 99.9, the bigger the value, the bigger the signal strength will be, and more reliable readings will be made. Q value is presented by 00 to 99, the bigger the better. It should at least be great than 70 for accurate operations.
M91	Displays the Time Ratio between the Measured Total Transit Time and the Calculated time. If the pipe parameters are entered correctly and the transducers are properly installed, the ratio value should be in the range of 100±3%. Otherwise the entered parameters and the transducer installation should be checked.
M92	Displays the estimated fluid sound velocity. If this value has an obvious difference with the actual fluid sound speed, pipe parameters entered and the transducer installation should be checked again.