



TERMS OF REFERENCE

SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF ULTRASONIC FLOWMETERS FOR TRANSMISSION LINES

Abstract

This technical specification provides detailed requirements for an ultrasonic flow meter intended for public bidding. The ultrasonic flow meter must deliver accurate and reliable measurement of liquid flow rates, suitable for transmission lines applications. Key performance indicators, operational capabilities, and compliance with relevant industry standards are specified to ensure the highest quality and compatibility with existing infrastructure. The document also outlines the criteria for acceptance, maintenance, and warranty terms, ensuring that the selected flow meter meets the stringent demands of ZCWD use and offers long-term value and efficiency.



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I. INTRODUCTION

A. Background

Non-Revenue Water (NRW), comprising both physical losses (leaks, bursts) and commercial losses (unbilled authorized consumption, meter inaccuracies), poses a significant challenge to the ZCWD. High levels of NRW not only result in economic losses but also strain water resources, exacerbate environmental impacts, and compromise service delivery reliability.

The purchase of flowmeters for transmissions lines is not only a means of acquiring equipment but a strategic investment in NRW management. By enabling accurate measurement and analysis of water flow rates, flowmeters empower ZCWD to identify, prioritize, and address NRW-related challenges effectively, ultimately contributing to the sustainability and resilience of water supply systems.

B. Objective

In essence, the objective behind the purchase of flowmeters for water transmissions for NRW analysis is to equip utilities with the necessary tools to mitigate water losses, enhance operational efficiency, and ensure the sustainable use of water resources. By investing in accurate flow measurement technologies, ZCWD can make informed decisions and take proactive steps towards achieving their NRW reduction goals, ultimately benefiting both the utility and the communities they serve.

C. Project Title

SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF ULTRASONIC FLOWMETERS FOR TRANSMISSION LINES

D. Project Location

Transmission Pipelines near the Water Treatment Plant, Pasonanca, Zamboanga City

E. Delivery Period

One hundred twenty (120) Calendar Days.



II. GENERAL SPECIFICATIONS

- a. Procurement & Implementation of Contracts for this Item shall be in accordance with RA 9184 (An act providing for the modernization, standardization, and regulation, of the procurement activities of the government and for other purposes.)
 - b. The bidder shall conduct a site inspection to assess the location and condition of the transmission line near at the Water Treatment Plant together with the ZCWD's representative prior the bid opening. This is to determine the extent of the installation activity, to verify the availability of network connectivity, to verify the distances and acceptable routes of the cabling to interconnect the sensor heads to the panel enclosure, to assess the availability of power supply and to further assess the scheduling of the actual installation activity.
 - c. The bidder must secure a "Certification of Conducting Site Inspection" from the Assistant General Manager for Operations.
 - d. This project shall not be subjected to extra works or variation order since this must be bid as "Goods". Any additional cost due to unforeseen events or additional items needed in the completion of this project shall be borne solely by the winning bidder/contractor. It shall be the responsibility of the contractor to prepare the bid and to consider all necessary things in the completion of project including permitting from the local government if necessary.
 - e. The winning bidder/contractor shall ensure that every personnel working in the project must equip with protective gear/gadgets for safety precautions. Hence, any accidents or mishap that may happen during implementation shall be the sole responsibility of the contractor.
 - f. The winning bidder/contractor shall be liable for restoration on any damages occurred on the ZCWD facilities as a result of the implementation of works thereon.
 - g. Winning bidder/contractor shall provide the required manpower, materials, tools, equipment, transport, supplies and other necessary services required for the completion of the installation on the specified duration.
 - h. The installation of the concrete pad, concrete barricades, galvanized pole, and any other civil or hot works shall be the sole responsibility of the winning bidder.
 - i. Permits are part of contractor's obligation and are included in the contract. It is the sole responsibility of the winning bidder to coordinate with other concerned agency in securing the necessary permits before engaging with the actual implementation of the project.
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- j. The ZCWD has the right to stop the work if the ongoing activities are detrimental to the existing ZCWD facilities.
 - k. Training of ZCWD personnel (to be identified by the end user) on how to operate the flowmeters shall be part of this project and this should be included in the project cost and duration.
 - l. The winning bidder shall produce two (2) copies of the Operation and Maintenance Manual of the supplied flowmeters in a hard bound.
 - m. The warranty period for this project components shall be with a period of 12 months (1 year) from the date of acceptance.
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III. SCOPE OF WORKS

A. Preparation Phase:

- a. Before the official bid opening, the bidder must conduct a site survey to evaluate the location and condition of the transmission line where the flow meters will be installed. The bidder must secure a "Certification of Conducting Site Inspection" from the Assistant General Manager for Operations.
- b. The winning bidder shall supply and install four (4) flowmeters in four locations at the Barangay Pasonanca near the vicinity of the Water Treatment Plant, details below:

Table-1. Location of Flowmeters

No.	Location	Pipe Size
1	Tanada St.	500mm
2	Fr. Eusebio St. (Brgy. Hall)	600mm
3	Sct. Limbaga St. (Waiting Shed)	500mm
4	Sct. Limbaga St. (Convention Center)	500mm

- c. Indicated below are the locations of the flowmeters to be installed.

Map-1. Location of Flowmeters



B. Installation of Flowmeters:

- a. Install the flowmeters at the designated locations according to the approved layout and specifications.
- b. Ensure proper alignment and mounting of the flowmeters to facilitate accurate flow measurement.
- c. Connect the flowmeters to the existing piping system using suitable fittings and adapters.
- d. Transmitter/transducer must be remote wired and secured inside a NEMA 3R enclosure.
- e. The enclosure must be spacious enough to fit all electronic devices inside to include the consideration for its ventilation.
- f. The winning bidder shall provide and submit the calibration sheet of each flow meters with a passing rate based on the standards stated at the Technical Specification.



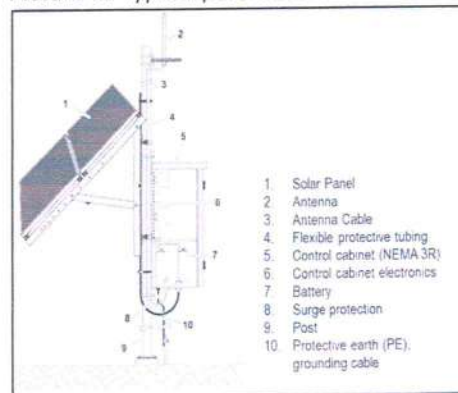
Picture-1. Sample enclosure with barricade



C. Electrical Connection:

- a. Provide electrical connections to power the flowmeters and any associated instrumentation or accessories.
- b. Ensure compliance with electrical safety standards and regulations during the installation process.
- c. The flowmeter must be powered by both normal power and solar power complete with accessories enclosed in a NEMA 3R panel in provision to have enough power even during the outage of the normal power.
- d. Solar power panel must be pole mounted together with the panel enclosure in a location with the assurance of capturing enough solar power.

Picture-1. Typical pole installation of enclosure and solar panel.



D. Documentation and Training:

- a. Prepare as-built drawings detailing the installed configuration of the flowmeters and associated components.
- b. Generate operation and maintenance manuals outlining procedures for operating and maintaining the flowmeters.
- c. Conduct training sessions for the client's personnel on the operation, maintenance, and troubleshooting of the flowmeter system.

E. Commissioning and Handover:

- a. The necessary field testing and commissioning is conducted by a qualified technician of the supplier such as installation and operation of flow meter before acceptance of goods.
- b. Conduct final commissioning tests to validate the performance and accuracy of the installed flowmeter system.
- c. A proving period of ONE (1) year must be observed.



- d. Any defects in parts and/or the entire component must be covered entirely by the bidder/supplier, with no costs incurred by the ZCWD.
- e. Obtain ZCWD's acceptance and sign-off on the completed installation.
- f. Hand over all relevant documentation, drawings, and manuals to the client's designated representatives.

F. Post-Installation Support:

- a. Provide ongoing technical support and assistance to address any issues or queries related to the installed flowmeter system.
- b. Honor warranty obligations and promptly respond to any warranty claims or service requests from the client.



IV. EQUIPMENT & TECHNICAL SPECIFICATIONS

A. Requirements

- a. The winner bidder shall supply and install the following:

QUANTITY & UNIT	PARTICULAR
Four (4) units	Ultrasonic Flowmeters (for pipe sizes: 3 units of 500mm & 1 unit of 600mm diameter)
Four (4) units	NEMA 3R enclosure for Transducer and Data Logger
Four (4) units	Pole installation of NEMA 3R enclosure with complete accessories for Power Supply
Four (4) units	Solar Panel, Charger Controller, Batteries, Switches and complete accessories
One (1) unit	Service Laptop

B. Technical Specification for Flowmeter

1. CLAMP-ON ULTRASONIC FLOWMETER	
A. Mode of Operation and Application	
Measuring Principle:	Ultrasonic (Clamp-On)
Flow Direction:	Bidirectional
Pipe Size:	500mm and 600mm pipe
B. Input	
Measurand:	Flow direction, Flow velocity, Sound velocity, Volume flow
B.1 Digital Input	
Number of Inputs:	2
Product Function (parameterizable)	Freeze output, Resetting Counter 1
Input Voltage:	2 V...10 V
B.2 Measuring Range	
Flow Velocity: (maximum)	12 m/s
C. Output	
C.1 Current Output	
Number of Outputs:	1
Signal Range:	4 - 20 mA
Output Voltage	24 V – 30 V
Load (maximum)	750 Ohm
C.2 Digital Output	
C.2.a Pulse Output	
Number	1
D. Accuracy	
Measuring Accuracy: Relative	1%2%



Precision Accuracy:	0.15%
Symmetrical tolerance of the velocity of flow	12m/s
E. Operating Conditions	
Medium Temperature	-40°C to +121°C
Applicable Pipe Material	Cast Iron, Copper, Glass, Iron, Ductile Iron, Polyethylene (PE), Polyvinylchloride (PVC)
E.1 Environmental Conditions	
Operational Ambient temperature	-10°C to +50°C
E.2 Degree of Protection	
IP rating of the transmitter	IP65
NEMA Enclosure Type of the transmitter	NEMA 4X
E.3 Electromagnetic Compatibility	
Standard for EMC	2004/108/EC
F. Structural Design	
F.1 Mechanical Design	
Design of the device	Remote (Separated) version, transmitter separated sensor
Design of the Sensor	Universal
F.2 Enclosure	
Material of the Sensor	Aluminum, Polyetherimide (PEI)
Material of the Transmitter	Polycarbonate (PC)
F.3 Electrical Connections	
Potential Insulation	Galvanic to all supplies
F.4 Display and Operating Controls	
Design of the Display	with LCD Display
Operating Controls	Pushbutton
G. Power Supply	
G.1 Electrical	
Voltage Type	AC
Nominal Voltage, AC	220 V
Supply Voltage, AC	90 - 240 VAC
Power consumption effective power	10 W
H. Communication	
Interface for Communication	RS 485
Protocol	Modbus
I. Certificates and Approvals	
MTBF	41 a
Standard for MTBF	SN 29500
Determination procedure	Calculation with component load
Applicability	SN 29500



J. Accessories and other Materials	
J.1 Solar Panel and Accessories	<i>(Should compensate power requirement of the offered flowmeter)</i>
Solar Panel	25 Watts or higher
Solar Controller	50 W or higher
Inverter	50 W or higher
Battery	12V, 7AH or higher AH
J.2 Panel Box	
Panel Box for Transmitter	IP65, NEMA 3R
Panel Box for Solar Controller	IP65, NEMA 3R
J.3 Electrical Post and Cage	
Post for Solar Panel & Panel Box	Galvanized Post (height may depend on the location to install)
Cage for Panel Box of Transmitter	Steel matting frame with angle steel bar, all coated with anti-rust paint and anchored in an elevated concrete-based platform.
J.4 Service Laptop	
Screen Resolution	1920 x 1080pixels
Processor	Core i7 or higher
Operating System	Windows 11
Storage	1 TB SSD
Battery	7h or higher
Graphic Card	NVIDIA GeForce RTX
Connectors	USB, Card Reader, Display Port, HDMI, Headphone Jack
J.5 Dashboard Monitor	
TV/Monitor	55" LED UHD Smart TV

C. Technical Specification for Data Logger

2. DATA LOGGER		
Communications	Programming and downloading	Via USB or RS232 or IR
	Internal cellular modem	Quad band modem supplying 850/900/1900/1900MHz bands.
Sensor Input	Analogue	Internal pressure transducer 0-300 psig, accuracy $\pm 0.1\%$
	Serial Input	RS232 (proprietary) for ultrasonic level monitors
Logging Features	Frequency	Recording Interval - programmable in 1 second increments or user defined, settings independent for primary and secondary recording.
	Memory	Primary recording can store at least 1 million readings multiple years of data and alarms/events.




		Configuration and data/alarms stored in non-volatile memory.
Physical	Operating temperature	-20 to +70°C or better
	Protection Classification	IP68 submersible at 10m depth over a 24 hours period or better
	Power Supply	Internally powered by a battery, operational for 5 years under normal operating conditions. Warranted for uninterruptible operation of up to 5 years. With external battery option. Complete with solar powered system.
Special features	Output data on screen should not be limited to the following:	Graphical presentation of data
		Logged data values from previous days of recording
	The logger is capable of sending text messages out but not limited to the following:	Signal strength test.
		Logger configures in database.
		Alarm status.
		Total volume for a specified duration.
Number of Channels	Power up logger anytime for remote request of data	
	2 Channel (1x Internal Pressure, 1x Digital Flow)	
Standard accessories	External antenna, coiled pressure hose with quick release couplings.	
Standards	ISO 14001:2015 and 9001:2015 certificates.	
	ISO 27001:2013	

D. Additional Requirements

- a. Prior the installation of the flowmeter, the winning bidder must provide installation plan and a schematic of the flowmeter system.
- b. Minimum one (1) year manufacturer's warranty.
- c. Must be compatible to the ZCWD's existing HWM data web portal.
- d. Must provide programming, operational and maintenance manual.
- e. Inclusive of free Data Online subscription for one year.



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