

Digital Water Flow Meter with Telemetry for Groundwater extraction monitoring as per CGWA notification

Technical specifications

1. Specification of Tamper proof Electronic water meter with telemetry

Metering Technology	: Ultrasonic or Electromagnetic
Communication type	: LAN (for internet connectivity) or LoRa WAN and/or Cellular (GPRS / 3G / 4G)
Tamper proof:	
a) Power source	: The meter shall be battery operated or UPS powered supply with provision of power OFF detection. The telemetry system units shall be battery operated or through external power supply. The metering data should be stored in the meter even if the telemetry system is off due to power failure.
b) Sealing	: The meter and telemetry system shall have proper mechanical and electronic sealing (through software) arrangement. Any attempt to open the meter or system enclosure should physically damage the tag.
Compliance	: The meter shall preferably be manufactured as per ISO 4064: 2014 Standards and shall have IP 68 ingress protection.
Accuracy	: The meter shall be of accuracy better than $\pm 2\%$ for the operating flow range (from 10 % to 100 % of maximum flow rate).
Test certificate	: The meter manufacturer shall submit the latest test/calibration certificate of the meter, from Fluid Control Research Institute (FCRI) / National Physical Laboratory (NPL) or any third party laboratory accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL), for every meter.
Parameters to monitor	: The meter (since installation of the requisite water meter) shall transmit the following parameters to a

secure cloud

- Timestamp
- Cumulative forward flow volume
- Cumulative reverse flow volume
- Cumulative Net volume
- Cumulative pump working hours
- Meter serial number
- Device last calibration date
- Borewell id (Provided by CGWA)

Cloud

: The Communication / telemetry data should be directly captured in a secure cloud. The cloud service provider should be empaneled with The Ministry of Electronics and Information Technology (MeitY).

Transmission frequency

: The data shall be transmitted minimum 2 times in a day

Battery life

: In case of battery operated meters the battery shall run at least for a period of 3 years with 2 transmissions per day. The battery shall be replaceable without any data loss.

Data acquisition

: The meter shall be supplied with complete AMR / AMI system with Data Management software. The Data Management Software must be capable of running on a standard PC.

The Data Management Software should be cloud based and should have web portal access so that user can view customer data through browser. In addition to above, Data Management Software will be installed on Server placed in Central Data Base/Control Room, and the software may have option for individual customer to view their meter consumption data through Web portal. Consumer, engineer and manager screens shall be available separately.

Data Collection Unit shall be capable of taking data from meter, pump etc. and should be posted in Data Management Software.

Real-time data to CGWA

: The un-tampered data from the secure cloud shall be sent to Central Ground Water Authority (CGWA) real-time data management platform once it is ready. Proper cyber security measures shall be taken in the secure cloud.

2. Installation of meter

Location : The meter shall be installed at the bore-well pump discharge line before any branching and preferably as shown in Figure. 1

Bypassing : There shall be no bypassing of pipe prior to the installed flow meter.

Full flow : The installation of the meter shall ensure the pipe shall have full of water at all times. Sufficient upstream and downstream straight length shall be provided for the meter (Refer to Figure 1.)

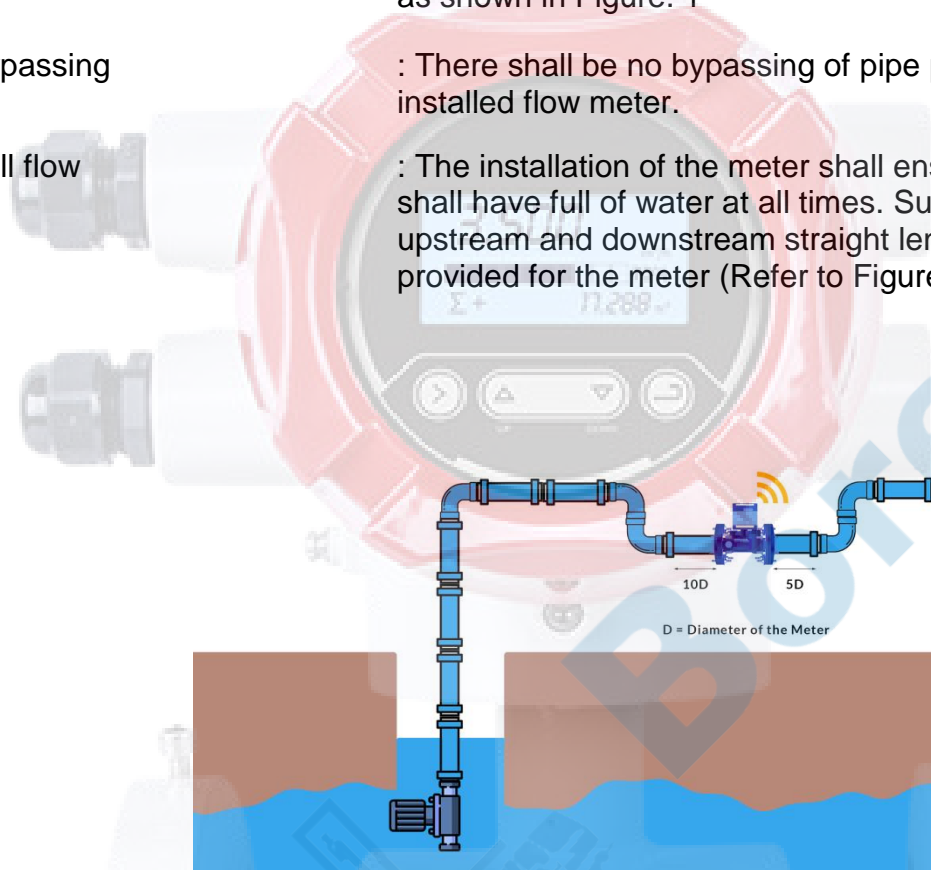


Figure. 1

Installation position of tamper proof flow meter with telemetry at groundwater abstraction structures.

3. DETAILED TECHNICAL SPECIFICATIONS OF AMR / AMI WATER FLOW METERS

3.1 Specification of flow meter

Flow meters shall meet the following metrological specification:

Turndown ratio of 10 or above

Accuracy $\pm 2\%$

Technology: electromagnetic or ultrasonic

3.1.1 Size:

1. DN40 - Flow range: 0.5 lps to 5 lps
2. DN100 - Flow range: 3 to 30 lps
3. DN150 - Flow range: 13 to 130 lps

Meter performance shall not get affected by external magnetic field, as specified in ISO4064.

Meters must be able to retain their accuracy, when installed in either horizontal and/or vertical planes.

3.1.2 Material of Construction:

The manufacturer shall provide specific details of materials used for various parts of the meter which must meet the specifications for the material of construction of the individual parts of the meters as per applicable standards (referred above).

- The water meter and accessories shall be manufactured from materials of adequate strength and durability.
- The body of the meter shall be of Brass/Bronze/MS/CI/SS/Engineering Plastic and compact enough to avoid tampering of meter. The manufacturer shall specifically mention in the offer, the material used in manufacturing.
- The materials, which come in contact with the potable water, shall not create a toxic hazard, shall not support microbial growth, and shall not give rise to unpleasant taste, odor or discoloration in the water supply.
 - The painting material used should be free from toxic constituents and safe for human uses and should not affect human health (Health Certificate should be attached/provided).
- Each meter should be supplied in separate individual box with its accessories, test/calibration Certificate (for accuracy parameter) and Guarantee Card for free repair/replacement during the warranty period.

3.1.3 Markings on the Body of the Meter:

- Make/Brand, Size / Nominal Dia.
- SI. No. / Year of Manufacture, Metrological specifications etc.

3.1.4 Meter indicator

The digital indicator shall be designed in such a way that if the protective glass is broken for a reason or another, the indicator cannot be removed from its place. The protective cover of the indicator shall be made of sturdy glass/PP/PC.

- It shall be of straight reading type.
- No. of digits and verification scale interval shall be as sufficient enough to meet the required accuracy.
- Totalizer shall be made of suitable material required to maintain IP 68 protection class.

3.2 Telemetry System

- The AMR/AMI system should have the facility to detect and communicate any abnormalities, i.e. high consumption, tampering etc. along with necessary alarms.
- The system will communicate in real time for battery and tamper alarms, in order to provide relevant monitoring and management data for operational purposes.
- The battery shall be replaceable without any data loss.
- The meters should report an alarm to the server as and when tampered.
- All Water Meter readings should be time stamped.
- The meter should have the capability to detect and record reverse flow separately.
- The meter should be capable of to detect Leak, Zero (No) Flow, High Flow.
- The AMR/AMI should operate even in electrically noisy environments with electromagnetic interference. The AMR/AMI should function even in the presence of high voltage power lines.
- Battery usage has to be indicated at the server. Provision should be provided to replace batteries if required.
- The communication shall be encrypted to avoid tampering.
- The meter should be configurable either using the DTU or from the server.
- Loss of communication should be indicated in the server within 48 hours.
- The meter should be able to log the daily flow data with a timestamp which is supposed to be sent to the cloud via telemetry for at least 2 years.
- In case the telemetry is non-functional because of power cut or weak cellular signals, the meter should be able to store the data and transmit to the cloud as soon as the telemetry system is live.
- This data shall also be used for retrieval in case of any dispute between meter data and online data.

3.3 Data Management Software

- The web based Data Management Software must be capable of running on a standard PC compatible with minimum Pentium Processor; in addition, the software must run under Windows XP Professional, Windows Vista, Windows 7 and / or latest version of Windows Operating System and HP Unix, Linux, Solaris, etc.

- The Data Management Software should be cloud base and should have web portal access so that user can view customer data through browser. In addition to above, Data Management Software will be installed on Server placed in Central Data Base / Control Room, and the software may have option for individual customer to view their meter consumption data through Web portal.
- The Data Management Software shall provide database backup/restore functions and must have real-time data access. The software should be web-enabled and alerts to be provided through email/SMS to the user.
- The Data Management Software shall post the reading from the communication infrastructure on to appropriate accounts within the Database.
- The Data Management Software should be able to display all kind of data on screen at any time.
- The Data Management Software should have capability to add additional customer information and create customizable data fields.

3.4 Lab Testing / calibration:

Testing or Calibration of meters shall be performed at ISO 17025: 2017 accredited laboratory. The accuracy of meter shall be within $\pm 2\%$ in the operating range. The meter shall have valid model approval certificate.

The meter shall have model approval from India or abroad. Every meter should be calibrated / tested for accuracy in the operating flow range (10% to 100%). At least 4 point calibration at 10%, 40%, 70% and 100% of maximum/rated flow shall be performed.