

# Water Meters 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	: LoRa WAN and/or Cellular (GPRS / 3G / 4G)
Tamper proof:	
a) Power source	: The meter shall be battery operated. The meter should not have any requirement of external power supply from mains or any renewable sources.  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 sealing arrangement. Any attempt to open the meter or system enclosure should physically damage the tag.
Compliance	: Water Meter shall be manufactured as per <b>ISO 4064: 2014</b> Standards and shall have IP 68 ingress protection.
Accuracy	: The meter shall be of accuracy class 2, T50, as per ISO 4064:2014 standard.
Test certificate	: The meter manufacturer shall submit the latest test certificate of the meter, from FCRI / National Physical Laboratory (NPL) or any government NABL accredited laboratory, for every meter.
Parameters to monitor	: The meter shall transmit the following parameters to a secure cloud <ul style="list-style-type: none"><li>● Timestamp</li><li>● Cumulative volume</li><li>● Cumulative pump working hours</li></ul>
Cloud	: The Communication / telemetry data should be directly captured in a secure cloud. The cloud service provider should be empanelled with MeitY.

Transmission frequency	: The data shall be transmitted minimum 2 times in a day
Battery life	: The battery shall run for a minimum 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 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 at the flow meter.
Full flow	: The installation of the meter shall ensure the pipe shall have full flow of water at all times. (Refer to Figure 1.)

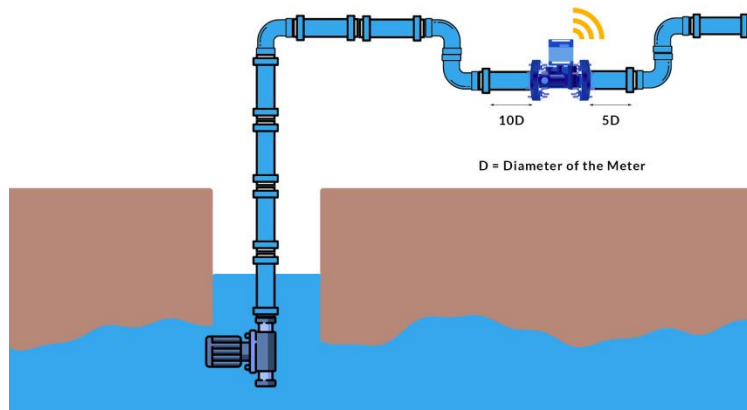


Figure. 1

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

### **3. DETAILED TECHNICAL SPECIFICATIONS OF AMR / AMI WATER METERS**

#### **3.1 Specification of water meter**

Water Meters shall have following metrological specification as per ISO 4064:2014 standard:

R80 or higher

MAP 16

Temperature class: T50

Accuracy class 2

Pressure loss:  $\Delta P$  63

##### **3.1.1 Size:**

1. DN40, Q<sub>3</sub> 16, T50, MAP16,  $\Delta P$ 63, Class 2 (Flow range: up to 5 lps)
2. DN100, Q<sub>3</sub> 100, T50, MAP16,  $\Delta P$ 63, Class 2 (Flow range: 1 to 25 lps)
3. DN150, Q<sub>3</sub> 400, T50, MAP16,  $\Delta P$ 63, Class 2 (Flow range: 25 to 130 lps)

Water Meter performance shall not get affected by external magnetic field, as specified in ISO: 4064.

Water Meters must be able to retain their accuracy, when installed in either horizontal and 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 body of the meter shall be of Brass/Bronze/Engineering Plastic/cast iron/cast steel. The firm shall specifically mention in the offer, the material used in manufacturing.
- The water meter and accessories shall be manufactured from materials of adequate strength and durability. 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 or discoloration in the water supply.
  - The painting material used should be safe for human uses and not affect human health (Health Certificate should be attached/provided).
- Each Water Meter should be supplied in separate individual box with its accessories, test Certificates and Guarantee Card.
- The party shall provide operation and maintenance for 7 years for the whole metering system.

##### **3.1.3 Markings on the Body of the Meter:**

- Make/Brand, Size / Nominal Dia.
- Sl. 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 specified in ISO 4064 standard.
- Totalizer shall be made of suitable material required to maintain IP 68 protection class.

### 3.2 Telemetry System

- The remote readings of AMR/AMI water meter need two-way communications without affecting reading throughout the entire period of contract including O&M.
- The remote readings of AMR/AMI water meters should be obtainable even under submerged conditions.
- 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 AMR shall have bidirectional data communication.
- For LoRa technology, the line of sight range of the transceiver module to a gateway shall not be less than 10 Km.
- The system should be capable of storing the following parameters; Instantaneous Reading of Consumption; Daily Consumption for the past 2 (Two) Years; Periodic Data stored for Water Audit and Analysis; Tamper / Alarm records.
- The meters should report an alarm to the server as and when they arise.
- The module enclosure is an integral part of the water meter and shall have IP 68 protection.
- All Water Meter readings should be time stamped.
- The AMR/AMI should have the capability to detect and record reverse flow separately.
- The AMR/AMI 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 meter should withstand extreme weather conditions: Temperature from -10 Deg C to +55 Deg C; Relative humidity from 5% to 95%; submerged conditions.

- The number of data transfer unit (DTU) shall not exceed 1 per square Km. Moreover, additional repeaters or gateway may be considered. However, it shall be provided with no additional cost.
- 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.

### **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 95, 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:**

The Lab Testing of all meters shall include following tests as per ISO: 4064:2014 standards which will be conducted at ISO 17025: 2017 accredited laboratory.

- Accuracy Testing
- Pressure tightness testing
- Pressure loss testing
- Static magnetic field testing
- IP68 testing
- Remote reading with different tamper alarms.
- Real index tests i.e. all the time the reading taken remotely shall match with meter index.