

	<b>Water Meter System</b>	09/12/2020
		Rev. 8
<b>Specification</b>		Page: 1

The specification defines a Water Meter System for residential and light commercial water reticulation systems. The System functions in various modes, interchangeable without any component or software upgrades.

The Water Meter System conforms to the Standard Transfer Specification (STS) standards for the transfer of credit through third party STS compliant Vending Systems.

#### 1 Water Meter System

The Water Meter System shall be constructed from materials with limited or no scrap value, comprising of the following components:

- a) Meter Box
- b) Mechanical Water Meter
- c) Water Demand Controller
- d) Isolating Valve (Optional)
- e) Consumer Stop Cock (Optional)
- f) Strainer (Optional)
- g) Wireless, in-house Customer Interface Unit (CIU).
- h) Field Maintenance Terminal (FMT) for diagnostics and fault finding.

#### 2 Meter Boxes

##### a) **Above Ground Meter Box**

Consists of a UV-resistant rectangular meter box with concave side walls for additional stability that is 800mm high x 280mm long x 100mm wide with LCD display positioned at the side or on top of the meter box. The lid of the box has a tamper proof locking mechanism with aperture to view the mechanical meter and WDC display.

##### b) **Wall Mount Meter Box**

Consisting of a UV-resistant meter box, with wall-mount base and mounting holes. The lid has a window, with a sliding cover to view both LCD and water meter.

##### c) **General**

- All internal joints are fusion welded, pressure tested to 15 Bar pressure.
- Inlet and outlets are 15mm or 20mm BSP polymer male or female threaded.
- The LCD shall be fitted behind a window aperture or closed with spring loaded slider.

#### 3 Water Meter

##### a) **Mechanical Water Meter**

At minimum a Class C plastic bodied volumetric type water meter, complete with pulse output approved by S.A Trade Metrology to SANS 1529-1. Meter sizes to be available in 15mm for residential consumers and a 20mm for light commercial consumers such as schools, clinics, kiosks, etc.

##### b) **Orientation**

The meter must be approved for both vertical and horizontal installation.

#### 4 Water Demand Controller (WDC)

##### a) **Mode of Operation**

- The WDC must be field configurable to function in any of the available Modes of operation, without requiring any software upgrades.
- Conventional Mode, functioning as a normal water meter, with valve in open position.
- Fixed Water Dispenser Mode, limiting supply to a preset daily or monthly volume.

- Free Basic Water, delivering configured daily or monthly allowance, at zero cost.
- Prepaid or Postpaid mode, accepting only STS 20 digit numeric credit tokens as per IEC62055-41.
- Compatible with any STS approved third-party Vending system.
- Life Line Credit, ensuring the customer has access to controlled water supply when unable to purchase credit.
- Emergency Water, delivering an annual allowance of free water in case of fire or emergency.
- Daily Water Conservation Limit, regardless if credit is available.

**b) Onboard Display**

The LCD Display displays the following:

- Electronic Totalizer in Cubic Meters (m<sup>3</sup>), to a resolution to 0.0005m<sup>3</sup> (or 0.5Litre).
- Remaining water available in Cubic Meters (m<sup>3</sup>) to a resolution of 0.001m<sup>3</sup> (or 1Litre)
- Highest priority error code that may be present on the System
- Battery status (good, low or empty)
- Valve status (open or closed)
- Possible water leak indication
- RF link to connected to CIU
- Pulse Indication, as a visible indication of pulses received from meter

**c) Cut-off Valve**

- Valve shall fully close when no credit is available and fully open when credit is available.
- Valve must operate from a minimum of 0.5 Bar, to a maximum of 15 Bar.
- The Valve must cycle if failed to close, with indication should the valve have failed.
- Valve disconnected or removed indication.

**d) Historical Data Recording**

- Monthly consumption history over the previous 12 months.
- Last 10 credit tokens entered, with type of token, volume and date stamp.
- End-of-month totalizer reading over the last 12 months.
- Monthly credit usage over the previous 12 months.
- Hourly electronic totalizer reading for the past 90 days.

**e) General**

- Radio antenna to be of the internal type, no external antennas protruding.
- In-the-field replaceable battery pack without the need to remove the meter from the installation.
- Battery life of 10 years, irrespective of usage.
- An Infra Red (IR) port for factory programming and configuration.
- Water and dust proof to IP68, with an operating temperature between -10°C to 55°C.

**f) Regulatory Approvals**

- STSA (Standard Transfer Specification Association) for compliance to IEC62055-41 & IEC62055-51.
- NRCS (National Regulator for Compulsory Specifications) to SANS1529-1 and SANS1529-9.
- ICASA (Independent Communications Authority for South Africa) to EN 300 220, EN 301 489-1&3 and EN 60950.
- Sigfox Ready Certification.

**g) Markings**

- Units of measurement in Cubic Meters(m<sup>3</sup>) only.
- Unique 11 digit numeric Serial Number, available in QR or Bar Coded formats for easy scanning.
- NRCS certificate number, as required by SANS1529-1 & 1529-9.

	<b>Water Meter System</b>
Specification	Page: 2

- STS Logo and certificate number as required by IEC 62055.

5 Consumer Interface Unit (CIU)

a) **General**

- A wall-mounted device installed inside the consumer house, linked to the meter via RF link.
- Fitted with a bi-directional 868MHz Radio Frequency (RF) communications link with a transmission range of 500 meters (line of sight).
- All radio and IR communication is securely encrypted.
- CIU battery life of 3 years. Replacement batteries shall be commonly available from any retail shop.
- A battery compartment, with sliding lid to replace batteries without having to open the unit or require assistance from technical personnel.
- Includes a 12 button silicon keypad with tactile feedback. Buttons shall include 0 - 9, Backspace and #.
- Button layout shall be according to the industry accepted standard STS layout.
- Pairing between the CIU and meter to be password controlled to prevent un-authorized tampering.
- A Keypad Lock function prevents un-authorized use.

b) **CIU Display**

- The LCD (Liquid Crystal Display) is always active (switched on), showing remaining credit without any intervention from the consumer.
- Refresh at least once every hour automatically, indicating remaining credit available on the meter.
- The possibility to manually refresh the remaining credit available at any time.

c) **Displayed Information**

- The display rotates every 10 seconds between the following 3 messages:
  - 1) Credit Status - (Credit, No credit, Credit Low, FBW, FBW Low, Lifeline, Emergency, etc.)
  - 2) Remaining Credit in Cubic Meters (m<sup>3</sup>) to a resolution of 0.001 m<sup>3</sup> (1 Litre)
  - 3) Additional messages such as an "Error Code", "Locked", "Leak", etc
- Icon for battery status of CIU
- Icon for Valve status (open or closed)
- Icon for Possible Water Leak
- Icon for RF communication link to PWC

d) **Additional Functions**

In addition to entering of credit tokens and viewing remaining credit, the consumer is able to perform the following functions on the CIU:

- Display the 11 digit Serial Number of the WDC
- Display the credit available individually on any of the credit registers
- Consumption for the current day
- Consumption for the current month
- Consumption average over the last 3 months.
- Electronic totalizer reading
- Total consumption to date
- Total credit loaded to date
- Paid Credit used for the month
- Monthly consumption history for the previous 3 months
- Leak indication, with the size of the leak in Litres/hour
- History of the last 10 tokens entered, with credit value and date stamp
- Lock or Unlock the meter, stopping water delivery when not at home.

	<b>Water Meter System</b>
Specification	Page: 3

- Activate Lifeline credit, if so configured
- Activate Emergency Water, if so configured
- View and Reset User Totalizer, measuring event specific water consumption

**e) Resettable Totalizer**

A resettable User Totalizer is available for the consumer to record water consumption for specific events, such as using the dishwasher or watering the garden. First reset the user totalizer on the CIU. After consuming the water, the consumer can now view the water consumed on the CIU display.

**6 Field Maintenance Terminal (FMT)**

**a) General**

- The FMT software functions on any compatible Windows based laptop or rugged tablet.
- The FMT may be used for drive-by AMR as well as remote meter interrogation for diagnostic and configuration purposes.
- The FMT comes complete with an USB RF Data Collector suitable to communicate with the meter, remotely without having direct access to the meter.
- All communications between the FMT and meter to be securely encrypted.
- The FMT is password controlled, with various levels of security.
- The FMT includes various diagnostics functions to fully assess the functionality of the system, as well as provide meter, credit and valve information.
- All historical information as recorded by the meter may be read using the FMT.

**7 Automation Features**

**a) Drive-by AMR (Automated Meter Reading)**

- Facilitates Drive-by AMR using a Data Collector, in conjunction with the FMT.
- The RF Data Collector uses a magnetic vehicle roof-mount antenna, for efficient radio communication.
- User defined fields, selecting only the required data fields to be uploaded.
- No duplication of meter data (Same meter read more than once)
- Unlimited meter records, with date/time stamp.
- AMR records available in CSV format, for easy import to Microsoft Excel, and other third party information systems.

**b) Fixed Network AMR (Automated Meter Reading) (Optional)**

- CIU shall to connect to the national Sigfox radio network, without having impact on the battery life of the meter.
- If a Sigfox network is not available, only Sigfox gateways may be installed and operated by an independent Network Operator.
- No individually managed proprietary networks, data concentrators or gateways are required.
- The following information shall be uploaded on a daily or hourly basis:
  1. Electronic Meter totalizer reading in m<sup>3</sup>
  2. Credit Status – Credit, low credit or no credit
  3. Credit Type being consumed – Paid, FBW, Special, Lifeline, Emergency
  4. Meter Mode – Payment, Conventional, FBW (Free Basic) or FWD (Fixed Water Dispenser)
  5. Valve position - Open or Close
  6. Tamper status, with date/time stamp of last tamper
  7. Leak indication, with leak size in Litres/hour
  8. Meter and CIU battery status
  9. Lock status – Utility or Consumer lock
  10. Error code, if present

	<b>Water Meter System</b>
Specification	Page: 4

- 11. Current month to date consumption
- 12. Previous month consumption

**c) Drive-by AMC (Automated Meter Configuration)**

- Facilitates mass meter re-configuration, without having to interrogate each meter individually.
- Meter Configurations are managed by Index and Revision, only updating specified meters.

**8 Meter Management System**

**a) General**

- A web interface shall be available to register, manage and monitor installed meters under the “Fixed Network AMR” as described above.
- The System monitors the performance of the meters in near real time, to be able to send out field-technicians to investigate possible faults and meter bypasses on meters.
- A monthly network fee may be payable for the use the System.
- No credit vending shall be performed on the System.
- Generate various reports from data available for each meter.
- All data received should be individually Date and Time stamped.
- Username and password for all Users of the system.
- Export functions to CSV format of all data available, viewable in Microsoft Excel.
- Live dashboard to view critical meter performance, and network efficiency.
- Training provided for all levels of the System.

	<b>Water Meter System</b>
Specification	Page: 5