

## Type Approval Certificate



**Type Approval Identification:** SA 1491 – AA3

**Issuing Authority:** NRCS, Legal Metrology, Type Approval

**Identification of Instrument:** “Utility Systems Model WMD” in-line electronic pre-payment water measuring system

**Applicant:** Utility Systems

*In accordance with the provisions of chapter 5, section 22(1) and 22(2)(a) and (b) of the Legal Metrology Act (Act 9 of 2014), the Chief Executive Officer hereby certifies that the pattern of the instrument(s) described herein meets the requirements for approval purposes of the,*

***Legal Metrology Act and SANS1529***

*and may be used for prescribed purposes after due consideration of any limitations or conditions imposed by the pattern description.*

*This certificate relates only to the metrological and technical characteristics of the pattern of the instrument concerned, as covered by the relevant Standard, it does not constitute or imply any guarantee as to the safety of the equipment.*

**Approved by:** Chief Executive Officer  
Original signed by A Moodley

**Date of Issue** 7 July 2015

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**1. INTRODUCTION**

**Name and Model:** “Utility Systems Model WMD” in-line electronic pre-payment water measuring system

**Manufacturer:** Utility Systems

**Legally Relevant Software:** Utility Systems FST software. The software is only retrievable through a PC or similar device.

**WMD Data Interface:** AMR (automatic meter reading) radio transmitter  
Infra-red

**Mechanical water meter used with the measuring system** “ASM Model LXHS”

**Optional Equipment:** None

“Utility Systems Model WMD” in-line electronic pre-payment water measuring system comprising a “ASM Model LXHS” mechanical water meter interfaced with the “Utility Systems WMD Model V100” electro-mechanical water managing device. The technical data is described in Table 1.

<b>Table 1</b>		
ASM Model		LXHS
Accuracy Class		C
Nominal flow rate ( $Q_n$ )		1,5 m <sup>3</sup> /h
Minimum flow rate ( $Q_{min}$ )		0,015 m <sup>3</sup> /h
Bore size		15 mm
Maximum operating pressure		1600 kPa
First display element of the meter		0,0001 m <sup>3</sup>
Verification scale interval of the meter		0,00002 m <sup>3</sup>
Indicating range of the meter		9999,99998 m <sup>3</sup>

Overall length of the meter		114 mm
Pressure loss group of measuring system		P 150
Verification scale interval of WMD		0,0005 m <sup>3</sup>
Indicating range of WMD		999999,9999 m <sup>3</sup>
Operating water temperature range of WMD (non-freezing)		-10 °C to 50 °C

## 1. CONSTRUCTION

### 1.1. General

The primary function of the measuring system is to measure and control the flow of water according to the flow data pre-programmed into the water management device.

The measuring system consists of two units:

- the user interface unit (UIU) for entering and retrieving data from the system which may be installed against a wall inside the consumer's house for easy access by the consumer, and
- the "Utility Systems WMD Model V100" water management device housed within a meter box.

The water management device incorporates a mechanical water meter and the "Utility Systems WMD Model V100" water control valve. The mechanical water meter produces two pulses per litre through an associated pulse probe which is connected to the "Utility Systems WMD Model V100" water control valve.

The water control valve, electronic module and meter probe form integral parts of the water management device.

### 1.2 Mechanical

The mechanical measuring mechanism of the electronic pre-payment water measuring system is a verified Class C water meter. The mechanical totaliser is fitted with magnets to operate the pulse sensor consisting of a magnetic sensor. The electronics and the non-replaceable long life lithium battery are located in a plastic housing that is completely sealed from moisture and dust. The WMD is designed to accept a pulse stream from the mechanical water meter at a rate of two pulses per litre. The pulse stream is provided by the action of an internal magnet mounted on a revolving wheel of the mechanical register and passing a sensitive magnetic sensor. The mechanical meter thus provides pulses to the WMD in order that the volume of water consumed can be calculated. The water control valve is fitted downstream of the meter to ensure that the meter is never starved of water following shut off.

The meter may be fitted with a non-return valve to prevent reverse flow.

**1.3 Electro mechanical**

**1.3.1 Water Management Device (WMD)**

**1.3.1.1 General**

The WMD consist of a glass-reinforced nylon and Polycarp plastic enclosure, incorporating the electronic components and a pulse pickup probe for use with a mechanical water meter which is equipped with an approved pulse generator. The WMD includes a LCD display which will display the measurement details. The WMD is capable of retaining 2500 hourly readings on a first-in, first-out basis. These readings can then be downloaded to a PC for analysis.

**1.3.1.2 WMD Display**

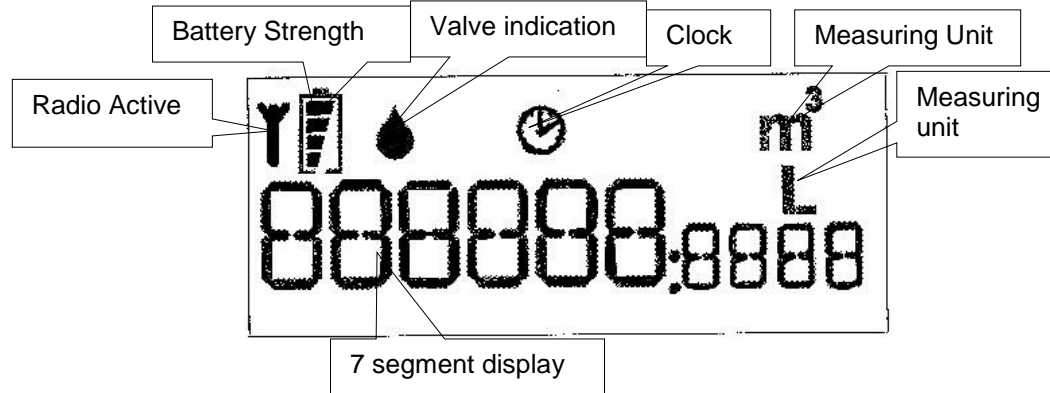
The “Utility Systems WMD Model V100” has a liquid crystal display (LCD) for displaying the serial number of the control valve and the total volume of water delivered through the management system. The LCD display consists of 10 digits, 6 digits with a height of 8 mm and 4 digits with a height of 5 mm. The decimal separator is a dot on the line between the larger and smaller digits. The smaller digits indicate the submultiples of a m<sup>3</sup>. The display cycles through the following information:

Parameter	Display	Symbol
Litres allocated	000000	L
Volume consumed to date	000000.0000	m <sup>3</sup>
Valve Closed	Nothing displayed	No water drop is displayed
Valve Open	Water drop is displayed	Water drop is displayed

An annunciator in a form of a water drop will indicate when the valve is open. In the case where the valve is closed, the display will not show a water drop annunciator. It will also indicate the battery strength by an annunciator consisting of bars. The bars represent the battery strength. The display will update within a second to register the volume of water which has passed through the water meter.

1.3.2 User Interface Unit (UIU)

1.3.2.1 Display



1.3.2.2 UIU Operator Keys

There are 12 UIU operator keys which are used to operate the UIU.

0-9 Keypad – To enter numerical values

← Key – To erase incorrect entries

# Key – To enter modes



## 2. OPERATION

### 2.1 General

The UIU may be used as an interface from the user to the WMD to upload credit onto the WMD. The UIU can be in one of four operating modes, i.e. Standby, Menu, Interrogate or Token.

The “Standby mode” is the default mode of operation. This is a lower power mode to conserve battery power. During this mode if selected the UIU will display the time as programmed in the UIU. The UIU always revert back to the Standby mode after 60 seconds of inactivity on the keypad. The UIU will become active as soon as any key has been pressed.

The “Menu mode” is initiated by the user by holding down the # key. The Menu mode is used to execute functions on the UIU. These functions are to configure the UIU (manufacturer settings), to set the time and date and to retrieve additional information not usually displayed, e.g. month end totals.

The “Interrogation mode” allows the user to transfer stored information in the WMD to the UIU. To enter the interrogation mode press the # key. The cursor will start to flash at the 1<sup>st</sup> digit position. Press the # key again. The serial number of the WMD will be displayed as an 11 digit number. Once the WMD and the UIU has communicated successfully with each other the UIU will display the remaining allocation of credit available, the total volume delivered to date and the time the next free allocation of water will be starting.

The “Token mode” enables the user to enter credit into the WMD. The token is in a form of a 20 digit token number which is generated by a vendor station. This number is then programmed into the WMD by using the UIU. After the token number is programed into the WMD the credit will be added to the system.

### 2.2 Tamper Detection

When the water managing device detects a tamper, the valve will close but will not indicate a tamper situation. The annunciator indicating water flow will be off, indicating a no flow situation. The tamper situation can then be investigated by connecting the infrared interface cable. The data will then be downloaded to the computer indicating the information on the tamper condition.

The valve will close and tamper situations will be logged and displayed when:

1. The pulse probe is removed from the meter
2. There is damage to the sensor cable
3. An external magnetic field is applied

### 2.3 Data Interface

The “Utility Systems WMD Model V100” is interfaced to the mechanical water meter via a pulse pickup probe. The “Utility Systems WMD Model V100” measuring system is programmed through an infrared interface cable or via RF from a service terminal. The measuring system may also be equipped with automatic meter reading.

### **3. PROTECTIVE AND VERIFICATION MARK**

#### **3.1 Application of the Protective Mark**

The protective mark shall be applied to the mechanical meter as per Illustration 4.

The “Utility Systems WMD Model V100” is potted (sealed to prevent ingress of moisture and dust) without the possibility of calibrating via any of the external terminals thereon. No further protective marks are required as any attempt to gain access will be evident.

The pulse output is connected to the “Utility Systems WMD Model V100” via a communication cable which shall be protected by applying a sealing wire and lead seal to the moulded lug provided for sealing (see Illustration 6).

#### **3.2 Application of verification mark**

The verification mark shall be applied to a dedicated seal which shall be affixed by passing sealing wire through a moulded lug on the upper body of the meter, then through a moulded lug in the lower body of the water meter and secured by a lead seal.

### **4. CONDITIONS OF APPROVAL**

4.1 The instrument shall be marked with the approval number SA 1491.

4.2 The serial number of the sealed electronic unit and the SA approval number shall be marked on the electronic unit and be clearly visible through the display aperture in the outer cover. The software version may also be marked with the serial number and approval number.

4.3 The decimal separator may be a comma or a dot on the line.

4.4 In the case of any discrepancy, the mechanical principal indicator will take precedence.

4.5 Any replacement pulse generator shall comply with test requirements in clause B.4.7.3 of SANS 1529 - 9:2008, or the applicable clause in the latest edition of SANS 1529-9.

4.6 The legally relevant software used in an instrument must be present in such a form that alteration of the software is not possible, and cannot be modified or uploaded via any interface or by any other means without altering the protective mark.

### **6. NOTES TO INSPECTORS AND VERIFICATION OFFICERS**

#### **6.1 Adjustment**

6.1.1 No adjustment can be made to the water meter. The meter will be dismantled when the meter is inaccurate.



## 6.2 Description of modification

6.2.1 The difference between this approval and the previous approvals under this approval number is the inclusion of the “ASM Model LXHS” mechanical water meter to be used in the “Utility Systems Model WMD” in-line electronic pre-payment measuring system.

## 6.3 Verification test requirements

6.3.1 The water meter shall be verified according to the relevant annex of SANS 1529-1 as a complete instrument.

6.3.2 When the “Utility Systems WMD Model V100” is connected to the water meter, the communication between the water meter and the “Utility Systems WMD Model V100” shall be checked for correct operation.

6.3.3 The pre-payment system complies with the requirements of clause 4.15 a), b) and c) of SANS 1529-9: 2003 and individual components may be verified separately according to requirements of annex B of SANS 1529-9: 2003. The mechanical meter shall be verified as a Class C meter when verified as a separate component.

6.3.4 When the complete system is verified as a single unit using the electronic display the tests for accuracy shall use a test measure with a volume of at least 100 L in order to comply with the requirements of clause 4.6.1.4 a) of SANS 1529-9: 2003 for a verification scale interval of 0,0005 m<sup>3</sup>.

## 7. ILLUSTRATIONS



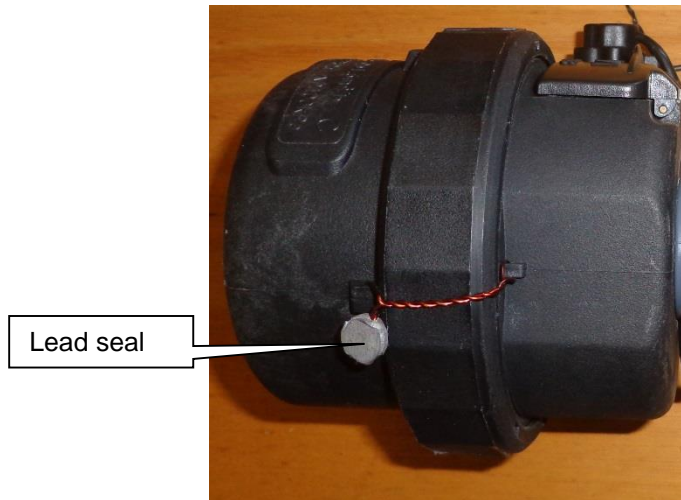
**Illustration 1**  
**Photograph of the “Utility Systems WMD Model V100” water control valve**



**Illustration 2**  
**Photograph of the UIU**



**Illustration 3**  
**Photograph of the “ASM Model LXHS” water meter**



**Illustration 4**

Photograph showing the application of the protective mark on the “ASM Model LXHS” water meter

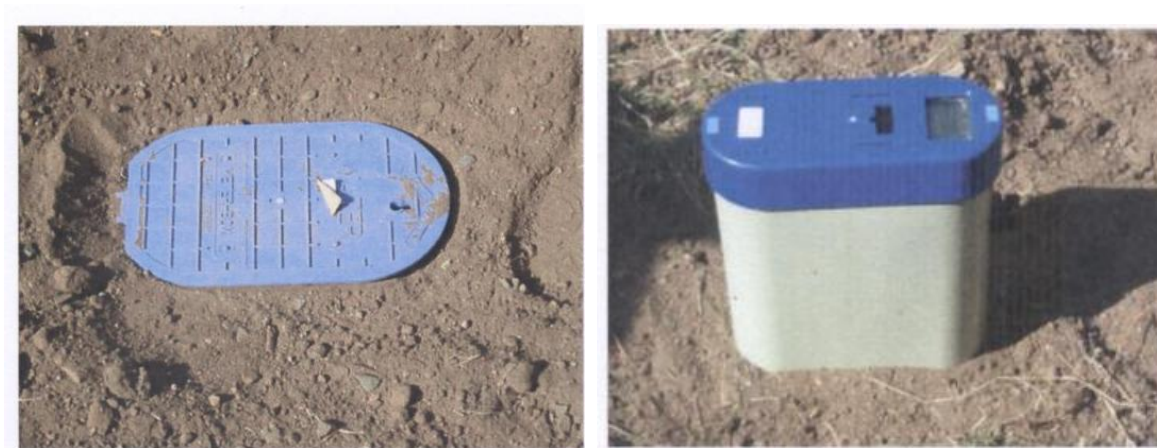


**Illustration 5**

Photographs showing the “Utility Systems Model V100” installed with the “ASM Model LXHS” water meter



**Illustration 6**  
**Photograph showing the application of the protective mark on the pulse output**



**Illustration 7**  
**Photograph of a typical installations**

**8. REFERENCES**

**8.1 Project**

Project number: 024/05/15

**8.2 OIML**

None