Type Approval Certificate

SA 1372–AA13

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 SANS1529-9

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.

Instrument: "Plastinternational/Telbit STS Prepaid System Model PWC 500" in line electronic prepayment water measuring system

Applicant: PLASTINTERNATIONAL (PTY) LTD

Date of Issue: *07 February 2022*
Date of expiry: *06 February 2032*

Approved by: TT Modiba

TT Modiba

Acting General Manager: Legal Metrology
National Regulator for Compulsory Specifications
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1. INTRODUCTION

Name and Model:	"Plastinternational/Telbit STS Prepaid System Model PWC 500" in line electronic pre-payment water measuring system
Manufacturer:	Plastinternational / Telbit (Pty) Ltd
Legally Relevant Software:	The software version is V1.0. (see clause 5.2 on how retrieve software version)
Data Interface:	RF Radio transceiver and Infra-red port
Pulse Interface:	Pulse output
Mechanical water meter:	Elster Kent Model KSM
Optional Equipment:	Customer Interface Unit (CIU)

In-line electronic pre-payment water measuring system comprising of "Kent Model KSM" mechanical water meter interfaced with the "PWC 500". The technical data is described in Table 1.

Table 1	
"Elster Kent Model KSM"	
Measuring System Accuracy Class	B
Mechanical Water Meter Accuracy Class	C
Length	114 mm or 165 mm
Permanent flow rate (Q_p)	1,5 m^3/h or 2,5 m^3/h
Minimum flow rate (Q_{min})	0,015 m^3/h or 0,025 m^3/h
Bore size	15 mm or 20 mm
Maximum operating pressure	1600 kPa
Volume of one revolution of the piston	0,00005 m^3
First display element of the meter	0,0001 m^3
Verification scale interval of the meter	0,00002 m^3
Indicating range of the meter	9999,99999 m^3
Pressure loss group	P100
Indicating range of PWC	9999,9999 m^3
Verification scale interval of PWC	0,0005 m^3
Operating water temperature range of PWC (non-freezing)	-10 ^oC to 50 ^oC

1.CONSTRUCTION

1.1. General

The “Plastinternational/Telbit STS Prepaid System Model PWC 500” incorporates a mechanical water meter with an electronic Prepaid Water Controller (PWC500). The mechanical water meter produces one pulse per half litre through an associated pulse generator, connected to the PWC.

The measuring system is designed and approved for outdoor use with meter, valve and other components being housed in a plastic housing. The primary function of the measuring system is to measure and control the flow of water according to the volume of water uploaded into the prepaid water controller (PWC).

The measuring system is a verified Class B, which consists of two units:

- the mechanical water meter, PWC500 prepaid water controller including pulse sensor and related components, housed within a meter box.
- the optional Customer Interface Unit (CIU) 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.

1.2 Mechanical

1.2.1 Measuring Mechanism

The mechanical water meter of the measuring system is a verified Class C water meter. The mechanical water meter produces a pulse stream at a rate of one pulse per 0,5 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 pulse sensor. The mechanical meter thus provides pulses to the PWC in order that the volume of water consumed can be calculated. The meter may be fitted with a non-return valve to prevent reverse flow.

1.2.2 Water Control Valve

The PWC control valve consists of Polypropylene Random Copolymer plastic (PPR) valve housing, Polytetrafluoroethylene (PTFE) valve seat and Chrome Plated Brass ball valve materials that are in contact with water. The 15 mm or 20 mm motor driven shut off valve with working pressure between 0 kPa and 1 600 kPa and maximum overload pressure of 2 400 kPa, to automatically start and end a delivery when credit is entered or depleted. The water control valve is fitted downstream of the meter to ensure that the meter is never drained of water following shut off.

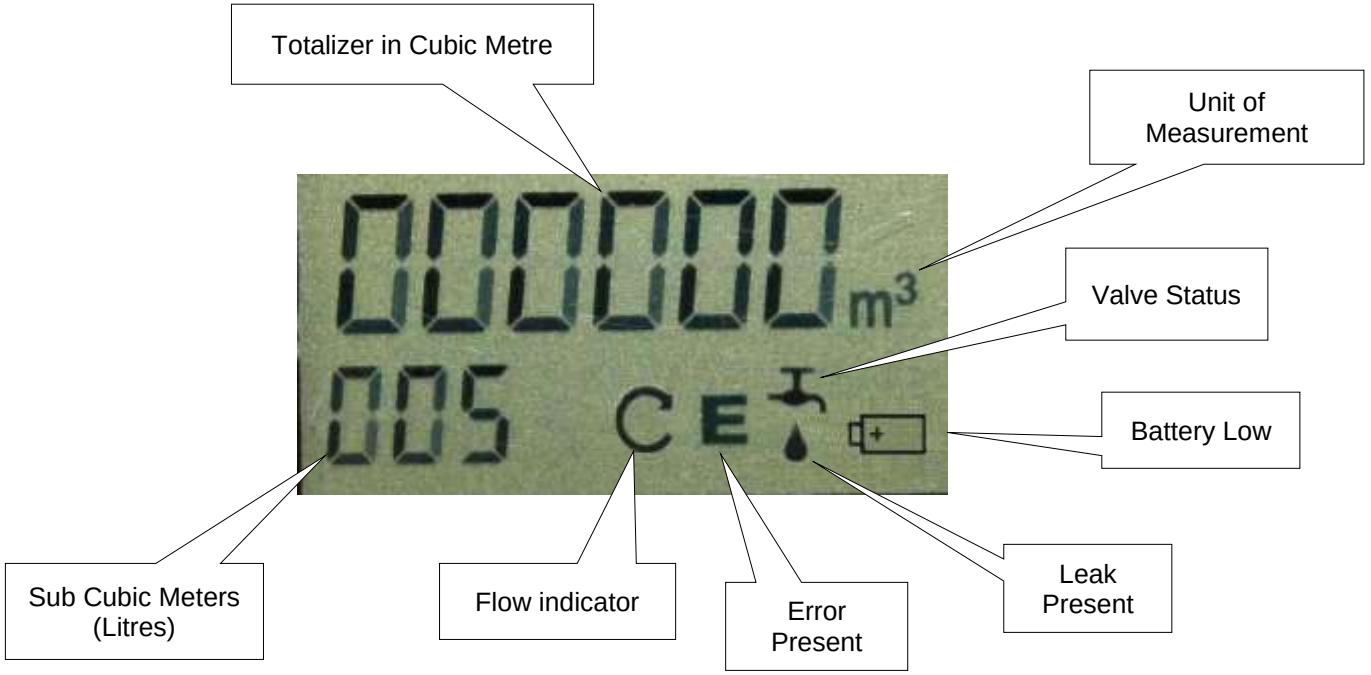
1.3 Electro mechanical

1.3.1 Prepaid Water Controller (PWC)

1.3.1.1 General

The PWC consist of a glass-reinforced nylon and polycarbonate plastic enclosure, incorporating the valve, electronic components and a pulse sensor for use with a mechanical water meter which is equipped with an approved pulse generator. The PWC includes an LCD display to display the measurement details. All measurements and configuration data are permanently stored in non-volatile memory. The PWC includes a replaceable lithium battery pack, located in a plastic housing that is completely sealed from moisture and dust. The PWC is fitted with a magnetic Pulse Sensor to accept a pulse stream from the mechanical water meter at a rate of one pulse per half litre.

1.3.1.2 PWC Display



The “PWC” has a liquid crystal display (LCD) for displaying the credit register and the total volume of water delivered through the “PWC”. The LCD display consists of 10 digits, 6 digits with a height of 8 mm and 3 digits with a height of 6 mm and a sub litres digit of 4mm. The smaller digits indicate the

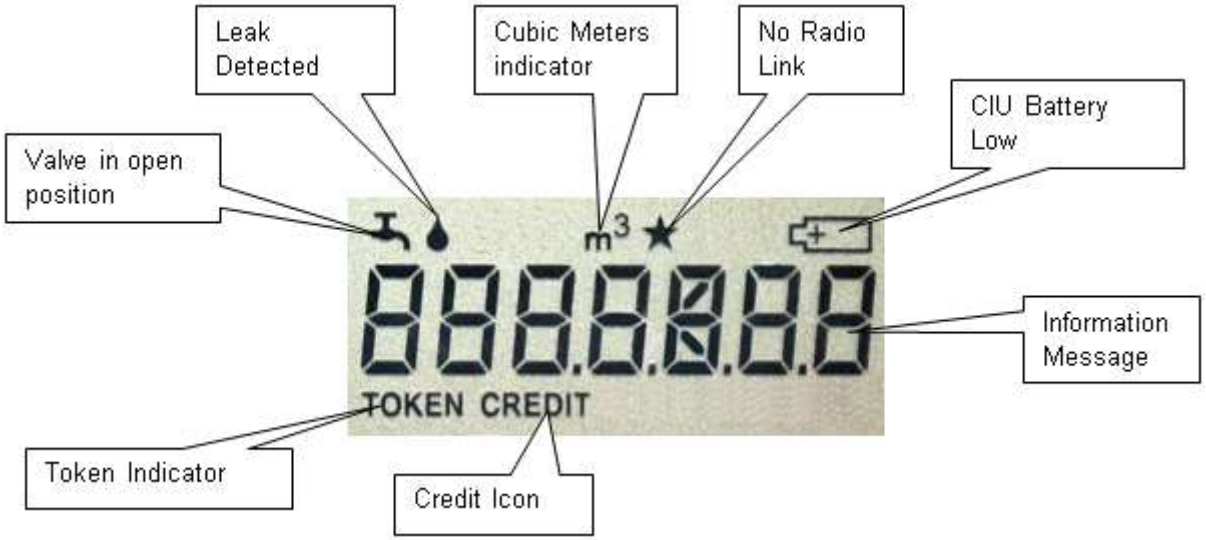
submultiples of m^3. The display cycles through the following information:

Parameter	Display	Symbol
Total Volume Consumed to Date	999999.9999	m^3
Credit Register	9999.999	m^3
Error Message (If present)	Err XX	E

An icon in a form of a water drop indicates a leakage is detected. When the Water Control Valve is in the open position, a Water Tap icon is present on the LCD. A Battery Low icon is displayed on the LCD when a battery low condition is present. The display instantaneously updates the register containing the volume of water which has passed through the water meter.

1.3.2 Customer Interface Unit (CIU)

1.3.2.1 CIU Display



1.3.2.2 CIU Operator Keys

The Customer Interface Unit consists of a 12-digit keypad, with an LCD display. 0 to 9 keys are used to enter numerical values, # key to enter commands and ← key is used to erase incorrect entries. The unit communicates with the PWC via a 2-way communication RF (Radio Frequency) link. The CIU is used to enter credit, viewing the remaining credit available, consumption data, as well as performing certain control commands.

The CIU refreshes itself every hour by requesting the current credit register value, as well as any information messages. The CIU can also be refreshed manually on demand.

- Information Messages

  The CIU display up to 3 text messages, received from the PWC:
  1) Credit Mode: The type and status of credit being dispensed: Credit, Credit Low, No Credit, Free, Free Low, Special, Life Line, Emergency Credit & Test.
  2) Credit Remaining: The credit available in above credit mode in m^3.
  3) Special Message: Meter Locked, Leak, Battery Low, Error xx

2.OPERATION

2.1 General

In the mechanical meter, water flows from the inlet into the measuring chamber through the strainer. Water is measured inside the measuring chamber by turning the piston configuration. The turning of the piston turns the indicator, which is mechanically connected to the piston and registers the volume delivered. The pulse pickup is installed in the cavity provided to the left of the register.

The CIU is used as an interface by the user to upload credit onto the PWC.

The “Prepaid mode” is the default mode of operation. Prepaid Mode requires credit to be loaded before water is delivered. A 20-digit numeric credit token is purchased and loaded to the controller via the CIU keypad. When the token is accepted, the credit register is credited and the valve opens. The Pulse Sensor receives pulse as water is dispensed, the credit register is decremented until no more credit is available, which causes the valve to close. Free basic water (FBW) credit may be loaded manually by means of FBW token, or delivered automatically on a daily or monthly basis.

The “Debit mode” water is delivered first, and payment is done later. As water is dispensed the credit register is decremented to run into negative credit. Top up payments are done using 20-digit numeric credit tokens loaded via the CIU keypad, to bring the credit register back to a zero or in positive value. If no credit is loaded, the valve closes after reaching a pre-set threshold. Free basic water (FBW) credit may be loaded manually by means of FBW token, or delivered automatically on a daily or monthly basis.

The “Fixed dispenser mode” delivers free basic water without the prepaid option or the infrastructure requirements to issue credit tokens. No CIU is required in this mode. The prepaid option could be introduced at a later stage, changing the system to a full prepaid water meter.

The “Conventional mode” the PWC functions the same as an electronic water meter, only to record water consumption. All recorded consumption information is available for electronic downloading using automated meter reading (AMR). No credit tokens are accepted, since no credit registers are enabled. No CIU is required, but may be used to display the meter totalizer, or daily and monthly consumption. No water valve is required, but if connected, the Utility Lock or Consumer Lock can be used to shut off water supply in case of non-payment. No free basic water credit delivery is available.

2.2 Tamper Detection

When the PWC detects a tamper, the valve will close. The Water Tap annunciator indicates the Control Valve is closed, 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 an error code will be displayed when:
1. No Pulses are being measured with the Pulse Sensor.
2. There is damage to the Pulse Sensor cable

The valve will not close, but an error code will be displayed when the Control Valve has been disconnected.

2.3 Data Interface

The “PWC” is interfaced to the mechanical water meter via a pulse sensor. The PWC is programmed through an infrared interface cable or via radio frequency from a Field Maintenance Terminal (FMT). The PWC is equipped with Automatic Meter Reading (AMR) capability.

2.4 Token Entry

The CIU is used to enter the tokens, and forward it to the PWC. The token is entered and displayed in the same block format as printed on the token voucher. Decryption of the token is done in the PWC, and not the CIU. Once the token is decrypted and validated in the PWC the credit register is updated, with a response message sent to the CIU indicating the credit value of the token loaded. A few seconds later the CIU automatically refreshes itself with the new credit value.

2.5 Monetary Calculations

No monetary to volumetric calculations are performed, as well as no tariff tables are stored on the PWC. Prepaid credit is loaded to the PWC in Litres, and all decrementing of credit through pulses received from the water meter is also in Litres.

2.6 Credit display

Credit is only given in volume and not monetary values.

2.7 Error codes on the display

The error codes on the PWC and on CIU and their descriptions

Error Code	Description
Err 01	Tamper Error
Err 02	Battery Empty
Err 03	No Flow or Meter Pulses
Err 05	Date & Time Reset
Err 06	Valve Stuck Open
Err 08	Valve Disconnected
Err 11	Eeprom Memory Failure
Err 12	Valve Timeout

Err 13	Flash memory Cyclic Redundancy Checking (CRC) Error
Err 14	Radio – Serial Port Interface (SPI) Failure
Err 15	Real Time Clock (RTC) Failure
Err 16	Crystal Failure
Err 17	Radio – Chip Failure
Err 18	Radio – Interrupted Request shorted

3. PROTECTIVE AND VERIFICATION MARK

3.1 Application of the Protective Mark

The mechanical water meter shall be protected from unauthorised opening by threading sealing wire through moulded sealing lugs supplied and apply a lead seal in such a way that the meter cannot be opened without breaking the protective mark, (see Illustration 4).

The PWC is sealed with tamper evident protective caps, that prevents opening of the device, without the possibility of calibrating via any of the external terminals there on. No further protective marks are required as any attempt to gain access will be evident. No mechanical water meter calibration is performed electronically on the PWC.

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 SA1372 – AA13.
4.2 The serial number of the PWC, SA approval number shall be marked on the PWC500 and be clearly visible through the display aperture in the outer cover.
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 on the pulse generator shall comply with test requirements in clause B.4.7.3 of SANS 1529 - 9:2019.
4.6 The legally relevant software used in the 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.
4.7 The units of measurement shall be m^3.
4.8 The measuring system is approved for volume credit only.

5. NOTES TO REPAIRER, VERIFICATION OFFICERS AND INSPECTORS.

5.1 Calibration/Adjustment

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

5.2 Retrieval of software version

The CIU needs to be paired to the PWC500, in order to send commands.
On the CIU enter #79# to request the firmware version of the PWC500.
After about 10 seconds, the firmware version is displayed on the CIU.

5.3 Description of modification

The difference between this approval and the previous approval (SA1372 – AA12) are;

- To incorporate the electronics and the ball valve to form one unit interfaced with “Elster Kent Model KSM” Mechanical water meter.
- Changed water control valve material.

5.4 Repair and Verification test requirements

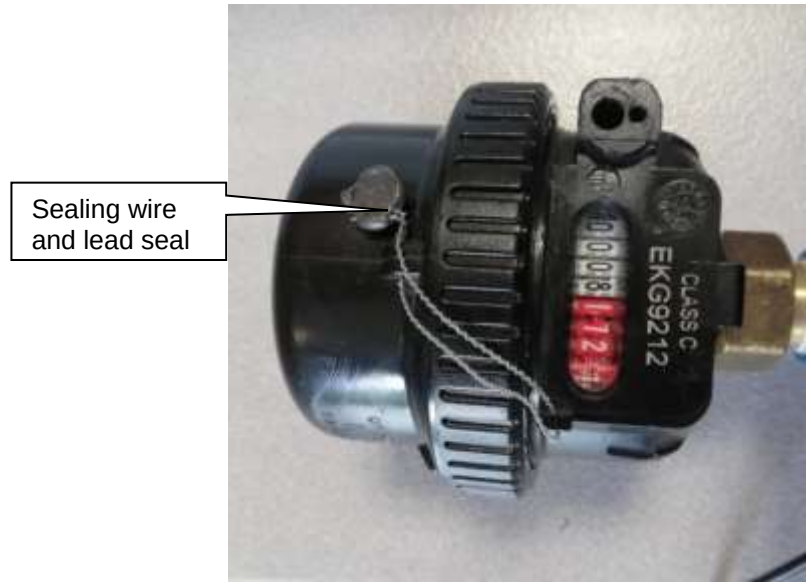
5.4.1 The water meter shall be verified according to the relevant annex of SANS 1529-1 as a complete instrument.
5.4.2 When the PWC is connected to the water meter, the communication between the water meter and the PWC shall be checked for correct operation.
5.4.3 The pre-payment system complies with the requirements of clause 4.15 a), b) and c) of SANS 1529-9: 2019 and individual components may be verified separately according to requirements of annex B of SANS 1529-9: 2019. The mechanical meter shall be verified as a Class C meter when verified as a separate component.
5.4.4 When the complete system is verified as a single unit using the electronic display, 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 4.6.1.5 a) of SANS 1529-9: 2019 for a verification scale interval of 0,0005 m^3.

6. ILLUSTRATIONS

Illustration 1
Photograph of the PWC500 Prepaid Water Controller

Illustration 2
Photograph showing the Customer Interface Unit (CIU).

Illustration 3
Photograph of PWC500 connected to the Elster Kent KSM.



Elster Kent Model KSM"

Illustration 4
Photograph showing the application of the protective mark on mechanical water meter.

Zonke Lite

Zonke Enclosure

EZ3 Enclosure

B800 Enclosure

Illustration 5
Photograph of typical meter boxes

8. REFERENCES

8.1 Project

Project number: 208 / 02 / 22 (096 / 08 / 21)

8.2 OIML

None