

Type Approval Certificate

SA 1372 – AA8

In accordance with the provisions of chapter 5, section 22(1) and 22(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: “Honeywell/Telbit STS prepaid System Model PWC 100” in line electronic prepayment water measuring system

Applicant: Elster Kent Metering (Pty) Ltd

Date of Issue: 2016/10/18

Approved by: HP Ferreira

Original signed by General Manager

General Manager Legal Metrology
National Regulator for Compulsory Specifications
Private Bag X25, Brooklyn, 0075
Republic Of South Africa

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1. INTRODUCTION

Name and Model:	“Honeywell/Telbit STS prepaid systems Model PWC 100” in line electronic pre-payment water measuring system
Manufacturer:	Telbit
Legally Relevant Software:	The software version is 2.3. PWC 100 (prepaid water controller). The software is only retrievable through the Maintenance Handheld unit when is connected to the PWC.
Data Interface	RF Radio transceiver and Infra-red port.
Pulse Interfaces:	Pulse output
Mechanical water meter :	“Kent Model KSM” and “Kent Model PSM”
Optional Equipment:	Customer Interface Unit (CIU)

In-line electronic pre-payment water measuring system comprising of “Kent Model KSM” or “Kent Model PSM” mechanical water meter interfaced with the “PWC 100”. The technical data is described in table 1.

“Kent Model KSM” or “Kent Model PSM”		
Length		114 mm or 165 mm
Accuracy Class		C
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		0,00001 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 °C to 50 °C

1. CONSTRUCTION

1.1. General

The measuring system is designed and approved for outdoor use with all valves 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 consists of two units:

- the 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, and
- the "PWC" prepaid water controller housed within a meter box.

The "Honeywell/Telbit STS prepaid systems Model PWC 100" incorporates a mechanical water meter, and the water control valve. The mechanical water meter produces one pulse per half litre through an associated pulse sensor which is connected to the prepaid water controller (PWC).

The water control valve, electronic module and pulse sensor form an integral part of the "Honeywell/Telbit STS prepaid systems Model PWC 100".

1.2 Mechanical

1.2.1 Measuring Mechanism

The mechanical measuring mechanism of the electronic pre-payment water 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 liter. 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 operates a 25 mm "Netafim Aquacity" solenoid actuated shut off valve with working pressure between 100 kPa and 1 500 kPa and maximum overload pressure of 1 800 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.

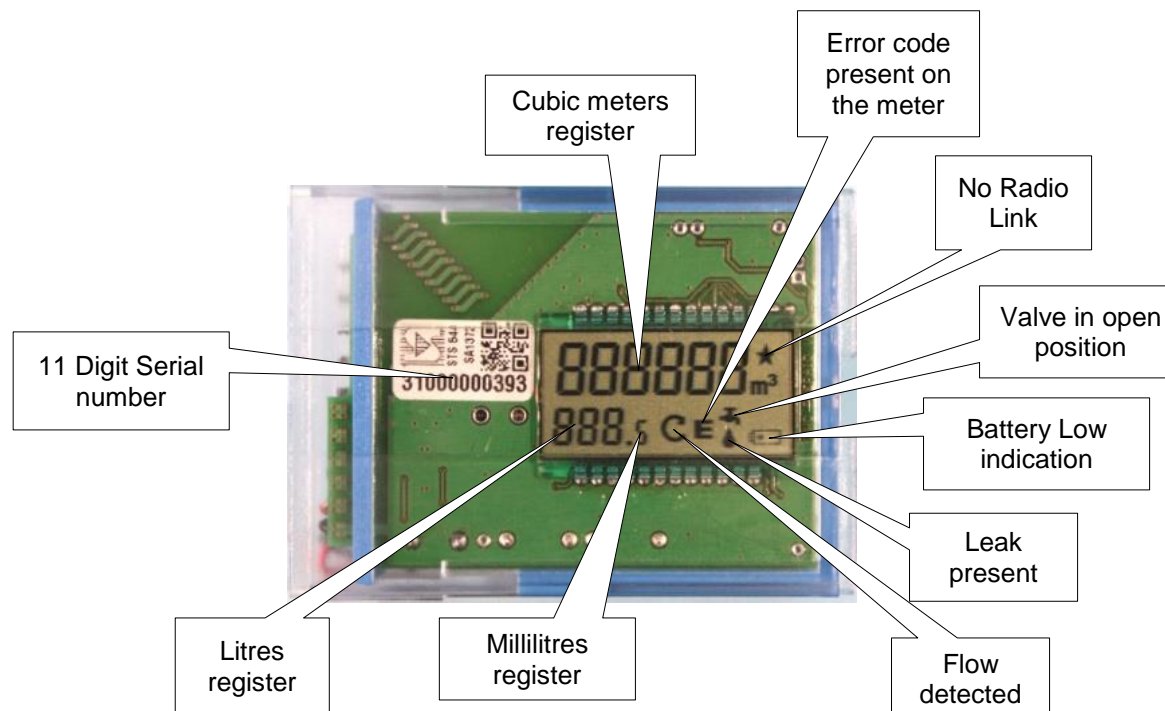
1.3 Electro mechanical

1.3.1 Prepaid Water controller (PWC)

1.3.1.1 General

The PWC consist of a glass-reinforced nylon and Polycarp plastic enclosure, incorporating the electronic components and a pulse sensor for use with a mechanical water meter which is equipped with an approved pulse generator. The PWC also incorporates the cables that transmit the signal to the water control valve. The PWC includes a LCD display which will display the measurement details. All measurements and configuration data are permanently stored in non-volatile memory. The PWC including a replaceable lithium or alkaline battery pack are 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 m³. The display cycles through the following information:

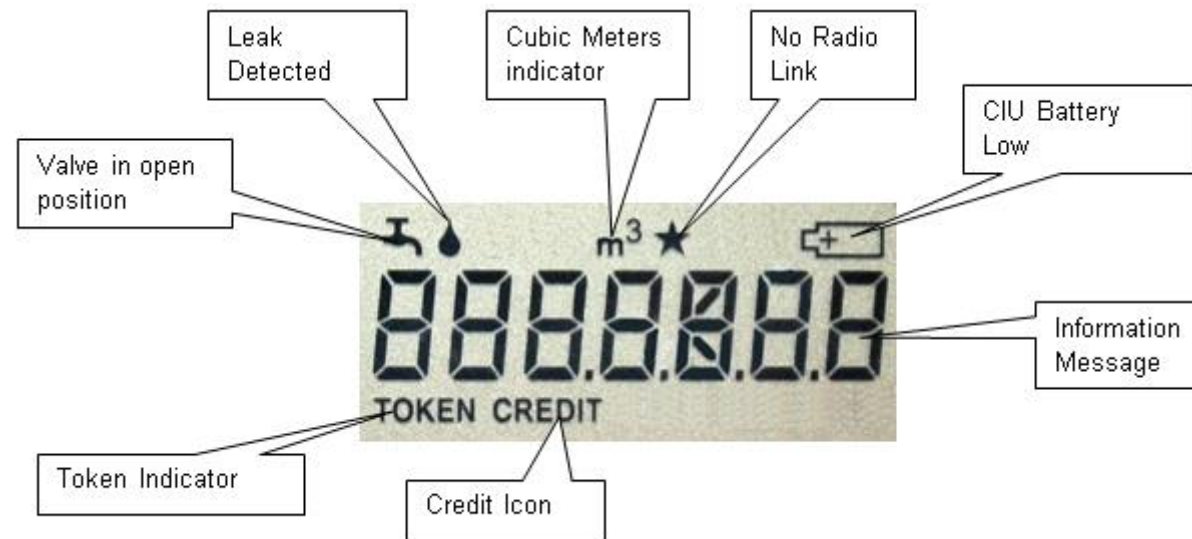
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Parameter	Display	Symbol
Total Volume Consumed to Date	999999.9999	m ³
Credit Register	9999.999	m ³
Error Message (If present)	Err XX	E

An annunciator in a form of a water drop will be indicated when leakage is detected. When the Water Control Valve is in the open position, a Water Tap annunciator is present on the LCD. A Battery Low annunciator is displayed on the LCD when a battery low condition is present. The display will update within a second to register 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 controller 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.

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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 m³.
- 3) Special Message: Meter Locked, Leak, Battery Low, Error xx



2. OPERATION

2.1 General

For the operation of the mechanical meter see SA 842. The CIU is used as an interface by the user to upload credit onto the PWC.

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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 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 Meter Maintenance Unit (MMU). The measuring system is equipped with Automatic Meter Reading (AMR).

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	Not used (Reserved for future tamper errors)
Err 02	Battery Empty
Err 03	No Pulses
Err 05	Date & Time Reset
Err 06	Valve Stuck Open
Err 08	Valve Disconnected
Err 10	Valve Timeout
Err 11	Eeprom Memory Failure
Err 13	Flash memory Cyclic Redundancy Checking Error
Err 14	Radio – Serial Port Interface Failure
Err 15	Real Time Clock 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 the moulded lugs supplied for sealing.

The PWC 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.

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 1372 – AA8.
- 4.2 The serial number of the sealed electronic unit, software version and the SA approval number shall be marked on the electronic unit 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 - 9:2008, or the applicable clause in the latest edition of SANS 1529-9.
- 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 m³.
- 4.8 The measuring system is approved for volume credit only.

5. NOTES TO INSPECTORS AND VERIFICATION OFFICERS

5.1 Adjustment

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

5.2 Description of modification

- 5.2.1 The difference between this approval and the previous approvals under this approval number is the use of the PWC interfaced with “Kent Model KSM” or “Kent Model PSM”.

5.3 Verification test requirements

- 5.3.1 The water meter shall be verified according to the relevant annex of SANS 1529-1 as a complete instrument.
- 5.3.2 When the PWC is connected to the water meter, the communication between the water meter and the PWC shall be checked for correct operation.
- 5.3.3 The pre-payment system complies with the requirements of clause 4.15 a), b) and c) of SANS 1529-9: 2008 and individual components may be verified separately according to requirements of annex B of SANS 1529-9: 2008. The mechanical meter shall be verified as a Class C meter when verified as a separate component.
- 5.3.4 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 4.6.1.4 a) of SANS 1529-9: 2008 for a verification scale interval of 0,0005 m³.

6. ILLUSTRATIONS



Illustration 1
Photograph of the prepaid water controller “PWC”



Illustration 2
Photograph showing the Customer Interface Unit (CIU)



Illustration 3

Photograph showing complete configuration of the measuring system



“Elster Kent Model KSM”

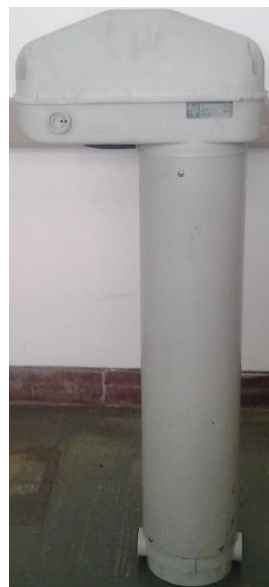
“Elster Kent Model PSM”

Illustration 4

Photographs of the mechanical water meters used in the measuring system



Zonke Enclosure



EZ3 Enclosure



B800 Enclosure

Illustration 5
Photograph of typical enclosures

8. REFERENCES

8.1 Project

Project number: 036/06/16

8.2 OIML

None