

# Type Approval Certificate

SA 449 – AA58

*In accordance with the provisions of, 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 Regulation 74*

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

*This certificate relates only to the metrological and technical characteristics 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:** "Smith Model LT 40", Liquid Meter

**Applicant:** Duplex Liquid Meter (Pty)Ltd

**Date of Issue:** 03/04/2018

**Approved by:** NT Madzivhe



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

This page is intentionally left blank.

---

**1. INTRODUCTION**

**Name and Model:** "Smith Model LT 40", liquid meter  
**Manufacturer:** FMC Sening  
**Legally Relevant Software:** 0x0f9399f0  
**Integral Printer:** None  
**Interfaces:** 1 x RS232, 1 x RS232/RS485, CAN (line with four wire)  
**Optional Equipment:** None

The type, flow rate, meter, pulse generator, flow computer/register, air eliminator, valve and temperature transmitter that may be used with this measuring system are described in Table 1.

1		2		3		4		5		6		7		8	
		Flow rate		Meter		Pulse Generator		Flow Computer/Register		Air Eliminator		Valves		Temperature Transmitter	
Type	Max.: Min:	Name, Model	Name, Model	Name, Model	Name, Model	Name, Model	Name, Model	Name, Model	Name, Model	Name, Model	Name, Model	Name, Model	Name, Model	Name, Model	Name, Model
LM	Max: 900 l/min Min: 150 l/min	"Smith Model LT 40"	"Metermatic Model PPT-200-C01"	"Metermatic Model EM6 - SVH01"	FMC Sening	"Sening Model ZVL80-2" two-way outlet valve	PT100 - PT 100-4-AWC								

**Table 1**

Note: Index to Table 1:

LM	Liquid meter
----	--------------

**2. CONSTRUCTION**

**2.1. General**

The gravity fed or pump fed measuring system, with an automatic temperature compensation function, is installed on the road tanker for the measurement of bulk deliveries of diesel and petrol. The measuring system comprises of a positive displacement meter, pulse generator and the flow computer/register. The flow computer/register is interfaced to the meter via the pulse generator, which converts the mechanical rotation of the meter into electrical pulses to be registered and displayed. The digital valve regulates the flow of product to the delivery hose. The same measuring system may be configured for measurements of diesel and petrol.

**2.2 Mechanical**

**2.2.1 Meter**

Liquid enters the meter through the manifold and causes the rotor to revolve by pressure on the vanes. The proximity of the rotor to the front and rear of the casing forms a "seal" whilst the profile of the casing guides the vanes on to the measuring crescent. The rotor spindle extends through a pressure tight seal in the meter front cover transmitting the rotor movement to the pulsar and register.

**2.2.2 Strainer**

The strainer are incorporated inside the air eliminator.

**2.3 Electro – Mechanical**

**2.3.1. Flow Register / Computer**

The "Metermatic Model EM6 – SVH01" electronic flow computer / register, is a microprocessor based control system for the delivery of pre-sets quantity. The electronics components, display and operator keys are located inside an explosion proof housing.

**2.3.1.1 Display**

The display is of a graphical LCD type (240 x 160) type with a backlight, which displays metrological and non-metrological information.

The display is divided into several sub-sections:

- Command and prompt.
- Fixed arm information.
- Variable arm information.

**2.3.1.1.1 Command and prompt section**

There are three lines available for commanding and prompting the operator. These lines are found at the top of the display. The first two lines are used to command the operator and the third line is used for editing, (To allow the operator to enter information).

**2.3.1.1.2 Fixed arm information**

The fixed arm information section is divided into two sections, one for each product controller. The information displayed for each arm is in the following manner;

- GRS volume
- Status description

- Preset amount
- Flow rate
- Delivery mode

The status description gives the status of the product controller. If the status is an error, then an error code and brief four letter status code of the error is displayed.

**2.3.1.1.3 Variable arm information**

The variable arm information section is divided into two sections, one for each product controller.

Three sets of information is displayed in the following manner;

- If '1' is pressed on the keypad, the following information is displayed;

GRS volume  
GRS totalizer  
Density

If the product controller send an invalid density reading, the relevant error will be displayed in the density field.





- If '2' is pressed on the keyboard, the following information is displayed;

GST volume  
GST totalizer  
Temperature



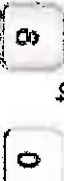

If the setting "Display GST" is disabled in the setup menu, these field will not be displayed. If the setting "Display GST" is enabled and the product controller send an invalid temperature reading, "xxxxxx" will be displayed for GST volume and the relevant error will be displayed in the temperature field.

**2.3.2. Operator keys**

The flow register / computer consist of sixteen (16) stainless steel type operator keys,

	To start a delivery.
	To stop delivery.
	To delete the values or exit the menu and go to the previous one
	To access and change the value of the parameter and to confirm the new entered/selected value.

## SA449 – AA58

	<p>To preset a volume to be delivered.</p>
	<p>Navigation keys. To scroll within menu or to select the elements displayed in the setup mode.</p>
	<p>To enter numeric values.</p>
	<p>To print a delivery</p>

### 2.3.3. Pulse Generator

The "Metermatic Model PPT-200-C01" pulse generator is fitted directly on top of the meter. It converts the mechanical rotation of the meter into electronic pulse.

### 2.3.4. Temperature Transmitter

A "PT 100 Model PT 100-4-4WC" temperature probe must be installed for temperature compensation, and it must be interfaced to the "Metermatic Model EM6" electronic flow computer / register.

## 3. OPERATION

### 3.1 Operator Screen

The following options are available from the operator screen;

- Print load information
- Start load
- Enter setup mode

#### 3.1.1 Print Load Information

To print the load information, press "PRN" key. (See section 3.2).

#### 3.1.2 Start Load

## SA449 – AA58

If permissive-1 is disabled in the setup menu, the preset will prompt on the display for the operator to press "PRE" key to begin the load. If the permissive-1 is enabled in the setup menu, the preset will prompt on the display to connect the permissive to begin the load.

### 3.1.3 Enter Setup Mode

Press " " key twice in a quick succession to enter setup mode. The preset will prompt on the display for the verification officer number and PIN number.

### 3.2 Load View Screen

The following sections are available from the load view screen;

- Load header
- Ticket heading
- Ticket information


### 3.3 Loading and Timeouts

#### 3.3.1 Loading

When the loading process begins, the following loading sequence must be followed;

- Enter the information that the preset has requested until the preset reads "Press PRE" to select an arm.

Press  key.

Select the arm number, and then press " " key.

- If more than one product is setup for the meter, use the up and down arrows keypad to select the product. If only one product is setup for the meter, this step will be omitted.

Use the up and down arrows keypad to select "pump" or "gravity" meter.

Press the start button to continue. (this could either be the  button on the keypad, or the remote start button on the side of the vehicle.

- Repeat all steps from the second bullet until all loads are finished.

If there is no ground permissive enabled, press " " key to end the load. If there is a ground permissive, remove the permissive to end the load.

#### Note on loading:

When the meter number is selected, the meter must be in the idle mode. If it is not, the preset will display "Meter unavailable please wait" and the operator must return to the second bullet above.

While the transactions are in progress, the product controllers will continuously monitor the permissive (if enabled) and all meter related parameters for example flow rate (no flow and low flow), pulsar integrity and temperature probe checks.

If permissive-1 breaks, the preset will pause the transaction, and allows the operator to reconnect the permissive within a given time, (The time that the preset allows the operator to reconnect the permissive is found in the setup menu) to continue with the current transactions.  
If the permissive-1 is not reconnected within the time allowed, all the product controllers will stop their transactions and the loading will automatically be terminated.  
If the permissive-2 breaks, all the product controller will immediately stop their transactions and the load will be terminated.  
If the STOP button is pressed the transaction will terminate immediately.

### **3.3.2 Timeouts**

There are multiple timeouts that are relevant when loading. These values can be set in the setup menu.


#### **3.3.2.1 No flow Timeout**




If the product does not begin flow within the specified time the EM6 will terminate the transaction indicating an error.

#### **3.3.2.2 Low flow timeout**

If the product flow rate falls below the minimum flow rate of the meter for longer than the specified time the EM6 will terminate the transaction indicating an error.

### **3.4 Accessing the parameters**

Press " " key twice to access the parameter programming mode,

Use " " to " " keys followed by " " key to confirm the password,  
- If the password is accepted the setup options will be displayed  
- If the password is incorrect the EM6 will return to the working screen

Press " " key to get into a particular parameter group



**4. PROTECTIVE AND VERIFICATION MARK**

**4.1 Application of the protective mark (Seal)**

**4.1.1 Hardware**

**4.1.1.1 Flow Computer/Register and Calibrating Device**

The flow computer/register shall be protected from unauthorized access by threading a sealing wire through the holes drilled in the heads of cover retaining screw, reset switch securing screw and calibration switch securing screws, in such a way that the flow computer/register cannot be opened and the reset switch securing screw and calibration switch securing screw cannot be removed without breaking the protective mark and apply the lead seal (see Illustration 2)

**4.1.1.2 Pulse Transmitter:**

The pulse transmitter shall be protected from unauthorized access by threading a sealing wire through the holes drilled in the heads of two (2) cover retaining screws, in such a way that the pulse transmitter cannot be opened without breaking the protective mark and apply the lead seal (see Illustration 5)

**4.1.1.3 Meter:**

The meter shall be protected from unauthorized opening and removal by threading a sealing wire through the holes drilled in the heads of two (2) cover retaining screw, and through the holes drilled in the two (2) screws, where the meter is connected with the pipe flange, in such a way that the meter cannot be opened without breaking the protective mark and apply the lead seal, (see Illustration 6).

**4.1.2 Software**

There is no software protective mark.

**4.2 Application of the verification mark**

The verification mark shall be applied in one of the following positions:

**Sticker:** If a sticker approved by the National Regulator is to be used it shall be affixed on the flow computer in such a way that it is easily accessible/visible, or

**Seal:** If a dedicated seal is to be used it shall be affixed by passing sealing wire through a hole drilled through the head of a screw permanently mounted in the place of the verification sticker.






## 5. CONDITIONS OF APPROVAL

- 5.1 The meter must be marked with the number SA 449 – AA58.
- 5.2 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.
- 5.3 Where peripheral equipment, which provides a visual or printed result of measurement, is used in conjunction with this instrument, the indication of measurement on the principal indicator will take precedence in the event of any discrepancy.
- 5.4 Where this instrument is used to determine a quantity at the time of sale, free access to the principal indicator must be granted to any person involved in the transaction.
- 5.5 The results of measurements must be displayed in litres (L).
- 5.6 The measuring system shall be used for bulk measurements of diesel and petrol.
- 5.7 The same measuring system may be used for measurements of diesel and petrol.
- 5.8 The measuring system shall be used within the flow rates as described in Table 1.

## 6. NOTES TO INSPECTORS AND VERIFICATION OFFICERS

### 6.1 Adjustment/Calibration

- 6.1.1 Adjustment is done via the keypad and the calibration switch. Normal operation is not possible in the calibration or adjustment mode.
- 6.1.2 The legally relevant software version number can be retrieved by performing the following sequence:

- Press " " keypad two (2) times, then
- Use numerical keypads to enter the Verification Officer (VO) number, then press " " keypad to confirm,
- Use numerical keypads to enter keypad "8" four (4) times,
- Select "SYSTEM SET UP" menu, then
- Scroll up/down the menu by pressing " " or " " keypads, to select "READ ONLY" and press " " keypad to confirm, then
- Select submenu "WEIGHTS & MEASURE CHECKSUM", the legal relevant software version will be displayed.

### 6.2 Description of modification

The difference/change between this approval and the previous approvals under this approval number is the use of the "Metermatic Model EM6", electronic flow computer/register with the "Smith Model LT40" liquid meter.

### 6.3 Verification test requirements

There are no unique or uncommon feature associated with this instrument which, require supplemented or adapted test requirements. All the relevant tests as described in the applicable standard / regulation shall be performed.

7. ILLUSTRATIONS



Calibration switch cavity

Illustration 1  
Photograph of showing the flow computer/register

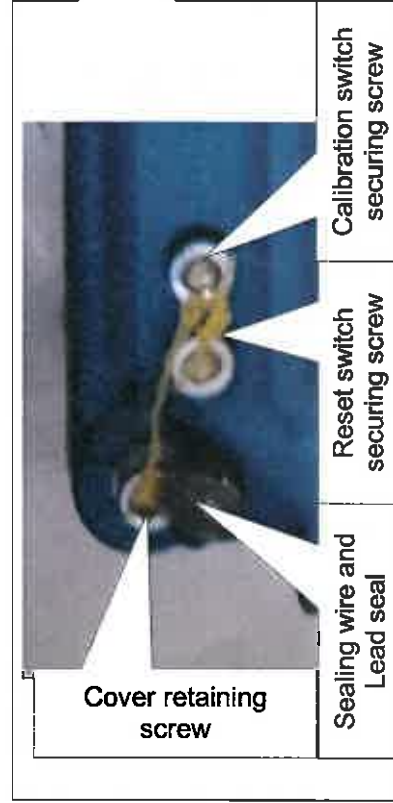


Illustration 2  
Photograph showing the sealing arrangement of the "Metermatic Model EM6" flow computer/register.



Sealing wire and  
Lead seal

**Illustration 3**  
**Photograph showing the application of the protective mark on the temperature transmitter**



Pulse generator

Meter

**Illustration 4**  
**Photograph showing the meter and pulse generator.**



Sealing wire and lead seal

Illustration 5  
Photograph showing the application of the protective mark on the pulse generator.



Pipe flange and meter connection

Sealing wire and lead seal  
(Unauthorized removal)



Sealing wire and lead seal  
(Unauthorized opening)

Illustration 6  
Photographs showing the application of the protective mark on the meter.

**8. REFERENCES**

**8.1 Project**

Project number: 142 / 01 / 18

**8.2 OIML**

R117/2007-GB1-17.03