



Australian Government

Department of Industry,
Science and Resources

**National
Measurement
Institute**

36 Bradfield Road, West Lindfield NSW 2070

**Supplementary Certificate of Approval
NMI S689**

Issued by the Chief Metrologist under Regulation 60
of the
National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

Smith Meter Model Fusion4 MSC-L Calculator/indicator for Liquid-measuring Systems

submitted by Smith Meter Inc.
1602 Wagner Avenue
Erie PA 16510
United States of America

NOTE: This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety. This approval has been granted with reference to document NMI R 117-1, Measuring Systems for Liquids Other than Water, dated July 2004.

This approval is subject to review at the decision of the Chief Metrologist in accordance with the conditions specified in the document NMI P 106.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern approved – certificate issued	23/03/15
1	Pattern amended (submitted by & description of pattern & descriptive Markings & figure 1) – certificate issued	01/08/25

CONDITIONS OF APPROVAL

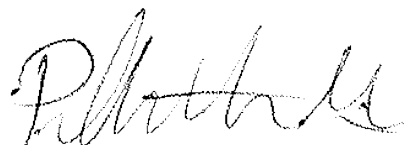
General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI S689' and only by persons authorised by the submitter.

It is the submitter's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate No S1/0B.

Signed by a person authorised by the Chief Metrologist
to exercise their powers under Regulation 60 of the
National Measurement Regulations 1999.



Phillip Mitchell

A/g Manager
Policy and Regulatory Services

TECHNICAL SCHEDULE No S689

1. Description of Pattern

**approved on 23/03/15
amended on 01/08/25**

The pattern is a Smith Meter model Fusion4 MSC-L calculator/indicator (Figure 1) with 12 dual pulse remote pulse transmitter or any NMI-approved measurement transducer generating compatible (#) pulse output proportional to volume throughput, for use in liquid-measuring systems.

(#) 'Compatible' is defined to mean that no additions/changes to hardware/software are required for satisfactory operation of the complete system.

1.1 Field of Operation

The field of operation of the pattern is determined by the following characteristics:

- Input pulse rate less than 10 Hz/channel
- Input voltage range for the calculator/indicator 230 V AC 50 Hz
- Liquid temperature range -50 °C to +150 °C
- Environment temperature ranges:
 - for the calculator/indicator -40 °C to +65 °C
- Non-linearity correction facility
- Density range for volume conversion to 15°C:
 - for generalised products 0.653 kg/L to 1.075 kg/L
 - for LPG 0.500 kg/L to 0.600 kg/L
- Accuracy Class 0.5 or higher

1.2 Indicator

The model Fusion4 MSC-L (Figure 1) with software version A20xx includes an alphanumeric liquid crystal display with the following maximum volume display:

In L when the resolution is set to 1

The accumulated total is displayed up to 99 999 999 L before rolling over to 0. The total can be reset to zero via the calibration mode.

1.3 Features

The instrument is configured via the Local Access Device or via the keyboard switches (Figure 2), where calibration switch has provision for sealing. The instrument can display the temperature of the liquid, the set density, and the volume at 15 °C. It can also store up to 10 000 (*) separate k-factors for different products. Selection of different products (k-factors) cannot be used simultaneously with flow rate correction mentioned above.

(*) Per dual pulse stream 10,000 factors, for products use linearisation table.

The instrument features the following functions:

- The Dashboard button (multiple steps, see manual 4418309) displays the accumulative total.
- The Dashboard button (Fusion4 portal is application for W&M BOL printing) prints a delivery report and resets the register to zero. Pressing the arrow button during delivery will display the flow rate.
- When interfaced to a flow control valve, the STOP/START button will begin a delivery or restart a delivery from the point at which it was stopped.
- If remote density setting is enabled, using the LAD will display the density which can be changed using the Dashboard buttons and can be saved. (see manual 4418309)
- In the same mode the operator can print a configuration report.

Note that the displayed density can only be changed when the delivery has been reset to zero.

1.4 Pulse Generator

Any compatible (#) NMI-approved dual pulse flowmeter can be used to provide a dual-channel pulse output.

- (#) 'Compatible' is defined to mean that no additions/changes to the hardware/software specified in this approval are required for satisfactory operation of the system.

1.5 Calibration

The model Fusion 4 MSC-L calculator/indicator is configured either for a single k-factor or up to 10 k-factors per dual pulse input to define the relationship between the volume throughput and the pulses generated by the measurement transducer.

1.6 Checking Facilities

The instrument incorporates the following checking facilities:

- A segment check is performed on the display only at power up. An easily accessible power switch is located on the vehicle to enable the checking of the segments before each delivery, should this be required.
- A check of the presence and of the correct signal output from the measurement transducer.
- Outputs are provided to control the delivery process and if necessary prevent measurements when errors are detected.
- When the indication reaches 90% of the maximum indication the displayed figure starts flashing and shutdown of the solenoid valves is commenced to prevent the indication from rolling over to zero.
- When configured for use with a printer, the Fusion4 portal checks for the presence and correct operation of the printer.

1.7 Volume Conversion for Temperature Facility

An electronic volume conversion for temperature facility is used to convert the measured volume to volume at 15 °C. Activation of the volume conversion feature is indicated by a label, showing the base reference condition (display also shows GOV and GSV) of the display and is activated via the management mode for the approved products. The conversion is based on ASTMIP-API Petroleum Measurement Table 54 for LPG or Table 54B for Generalised Petroleum Products.

The density is either fixed via the Configuration (see manual) or is available for adjustment prior to measurements taking place (can also be measured by 4-20 mA transmitter). In such applications, temperature measurement is required which can be displayed by the Fusion4 MSC-L calculator/indicator.

For temperature measurement, a PT100 4-wire RTD probe, which has a resistance of 100 ohms at 0 °C can be used, or any other compatible (#) temperature probe with similar characteristics.

When displaying the volume at 15 °C, the model Fusion4 MSC-L calculator/indicator is connected via the Fusion4 Portal to a printer.

If the nature of the measured volume is entered into the calculator/indicator at the beginning of the measurement operation, then a printer is mandatory for printing the delivery details and the manually-entered density for which the volume conversion is set.

1.8 Flow Control Valve

Any compatible (#) solenoid-operated flow control valve, located downstream of the flowmeter, may be interfaced to the instrument for controlling the delivery process and to stop measurements in the event of errors detected by the checking facility.

(#) 'Compatible' is defined to mean that no additions/changes to hardware/software are required for satisfactory operation of the complete system.

1.9 Verification Provision

Provision is made for the application of a verification mark.

1.10 Sealing Provision

Access to the calibration parameters is via the calibration switch which has provision for sealing using a sealing plug/wire and lead or similar seal (Figure 2).

1.11 Descriptive Markings and Notices

Instruments are marked with the following data, together in one location, in the form shown at right:

Manufacturer's mark, or name written in full	Smith Meter Inc.
Model number	Fusion4 MSC-L
Serial number
Pattern approval number	NMI S689
Year of manufacture
Accuracy class	0.5
Environmental class	C or I (#1)
Liquid temperature range	-50 °C to +150 °C (#2)

(#1) Environmental class for printers is Class B

(#2) Required when the volume conversion for temperature facility is activated

For applications other than LPG, when the volume conversion facility is activated, the indicator reading face shall be marked 'Litres at 15 °C' or 'Volume at 15 °C'.

The minimum measured quantity specified for the fuel dispenser is marked or displayed on the face of the indicator in the form 'Minimum Delivery 1000 L'.

TEST PROCEDURE No S689

Instruments shall be tested in accordance with any relevant tests specified in the National Instrument Test Procedures.

The instrument shall not be adjusted to anything other than as close as practical to zero error, even when these values are within the maximum permissible errors.

Maximum Permissible Errors

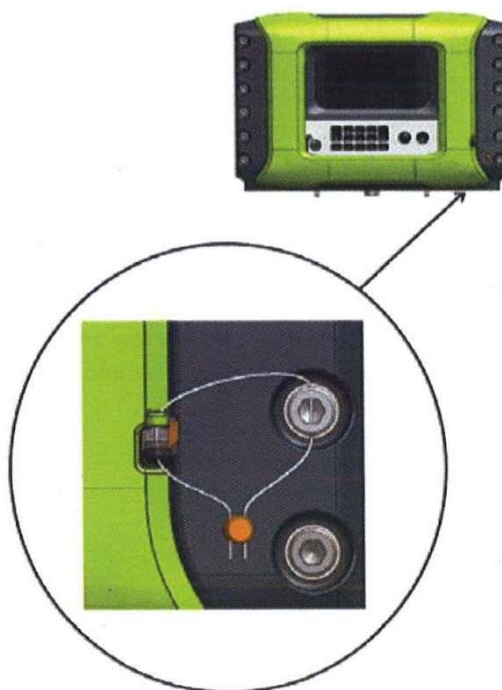
The maximum permissible errors applicable are those applicable to the fuel dispensers to which the instrument approved herein is fitted, as stated in the approval documentation for the fuel dispensers or in Schedule 1 of the *National Trade Measurement Regulations 2009*.

FIGURE S689 – 1



Simth Meter Model Fusion4 MSC-L Calculator/indicator

FIGURE S689 – 2



Typical Sealing of Calibration Switch

~ End of Document ~