Australian Government
Department of Industry, Science and Resources

National Measurement Institute

36 Bradfield Road, West Lindfield NSW 2070

Supplementary Certificate of Approval

NMI S313A

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 1010A Controller 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 and variants 1 & 2 approved – interim certificate issued	27/02/03
1	Pattern and variants 1 & 2 – certificate issued	8/04/03
2	Pattern and variants 1 & 2 reviewed & updated; variants 3 & 4 approved – certificate issued	17/08/11
3	Pattern amended (submitted by & description of pattern & figure 1,2 and 3) – certificate issued	01/08/25

CONDITIONS OF APPROVAL

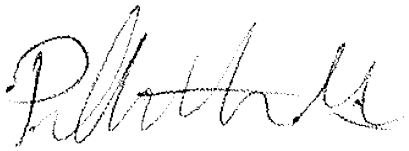
General

Instruments purporting to comply with this approval shall be marked with approval number 'NMI S313A' and only by persons authorised by the submittor.

It is the submittor'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 Certificates No S1/0/A or 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 S313A

1. Description of Pattern

approved on 27/2/03
amended on 01/08/25

A Smith Meter model 1010A flowmetering controller for use in liquid-measuring systems incorporating compatible (#) NMI-approved flowmeters.

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

1.1 Field of Operation

The field of operation is determined by the following characteristics:

- Environmental class −25 °C to +55 °C
- Petroleum density range 610 kg/m^3 to 1076 kg/m^3
- Liquid temperature range −10 °C to +50 °C
- Power supply 240 V AC mains supply
- Maximum input frequency 2000 pulses/second/channel
- Accuracy class Class 0.5

Suitable for use in interruptible and non-interruptible flowmetering systems.

1.2 Flowmetering Controller

The model 1010A flowmetering controller (Figure 1) has a single dot matrix screen display for controlling and displaying the volume of up to four flowmeters (loading arms/lines).

The volume display can be programmed for 0.1 L or 1 L increments.

The delivery operation is authorised by entering a personal identification number or via the optional Smith Meter model 810TKIS touchkey reader for identifying the user. The data entry/selection is made via the eleven numeric keys and seven function keys.

The display function key (depending on configuration) can provide the following displays for each loading arm/line:

- Volume at +15 °C;
- Metered volume;
- ACCUM – (an eight digit accumulated totals);
- Flow rate;
- Density setting;
- Temperature;
- Last load temperature; and
- Pre-set.

1.3 Linearity Correction Facility

When the linearity correction facility is enabled up to five k-factors can be entered as a function of frequency (flow rate) in the range 0 to 2 kHz generated by the measurement transducer. The base k-factor can be set within the range 0.001 to 50 000 pulses/litre and additional k-factors may be entered limited to ±5% variation from preceding or subsequent k-factors.

1.4 Checking Facilities

The instrument incorporates the following checking facilities:

- A segment check is performed for the selected volume display when the loading arm/line is selected.
- Monitors the dual output signal from a measurement transducer.
- In the event of a power failure the delivered volume remains displayed to allow the transaction to be finalised. Also the instrument maintains the last 200 transactions in a non-volatile memory.
- Outputs are provided to control solenoid-operated valves to control the delivery process and prevent measurements when errors are detected, e.g. when temperature or density measurements are outside approved range.

1.5 Pulse Generator

The calculator/indicator is approved for use with a Veeder-Root model 767163-305 pulse generator as described in the documentation of approval NSC S409, or any other compatible approved measurement transducer.

1.6 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.

1.7 Temperature Probe

For temperature measurement applications, a Moore Industries model TX2 PT100 4-wire RTD transmitter or any other compatible 4 to 20 mA temperature transmitter may be used representing the temperature range specified in the field of operation.

1.8 Volume Conversion For Temperature Facility

An electronic volume conversion for temperature facility is used to convert the measured volume to volume at +15 °C. The conversion is based on ASTM-IP-API Petroleum Measurement Table 54A for Crude Oil or Table 54B for Generalised Petroleum Products. The conversion device is approved for temperature range −10 °C to +50 °C.

The converted volume, temperature and density setting may be viewed using the DISPLAY function key.

(#) ‘Compatible’ is defined to mean that no additions/changes to hardware/software are required for satisfactory operation of the complete system including all checking facilities.

1.9 Operational Procedure

The following is a typical operating sequence, however each site may require a different operating procedure.

- Connect overfill protection system.
- Enter driver personal identification number (PIN) or use Touch Key.
- Select the required loading arm/line (initiates a segment check on selected indicator).
- Enter pre-set quantity.
- Press start or cancel.
- Enter another load.
- During the operating procedure other optional prompts may be displayed such as prompt for compartment number or truck identification.

1.10 Verification and Sealing Provision

Provision is made for a verification mark to be applied.

Access to the calibration parameters is via a sealed switch located on the side of the instrument.

1.11 Markings and Notices

A. The following information shall be clearly and permanently marked on one or more permanently attached nameplates:

Manufacturer's identification mark or trade mark	…..
Model number	…..
Pattern approval mark	NMI (or NSC) S313A
Serial number of the instrument	…..
Year of manufacture	…..
Environmental class	class C
Density range (*)	610 kg/m^3 to 1076 kg/m^3
Liquid temperature range (*)	−10 °C to +50 °C

(*) Required when volume conversion for temperature is utilised.

B. When the instrument is programmed to display deliveries at reference temperature, the indicator reading face shall be marked 'Litres at 15 °C' or 'Volume at 15 °C' or similar.

The pre-set indication is marked 'Pre-set Not in Use For Trade'.

The minimum measured quantity specified for the meter shall be displayed on the indicator (e.g. in the form 'Minimum delivery 1000 L'). Alternatively, the instrument can be programmed with a minimum pre-set value that is equal to or greater than the minimum quantity specified for the flowmeter.

2. Description of Variant 1 approved on 27/2/03

The model 1010H flowmetering controller (Figure 2) which is similar to the pattern except that it incorporates an alphanumeric dot matrix display with two lines of 16 characters for displaying messages/prompts, and a seven segment, five-digit volume display for each flowmeter (loading arm/line).

The instrument can control up to two flowmeters (two loading arms/lines).

3. Description of Variant 2 approved on 27/2/03

The model 1010H flowmetering controller with a model 1010 expansion unit (Figure 3) for controlling and displaying the delivered volume of up to four flowmeters (loading arms/lines).

When an additional 1010H controller is also interfaced, up to six flowmeters (loading arms/lines) may be controlled simultaneously.

4. Description of Variant 3 approved on 17/08/11

The model 1010A C flowmetering controller which is similar to the pattern in external appearance, however it has updated hardware and it uses either version V5.xxx or version P5.xxx software.

5. Description of Variant 4 approved on 17/08/11

Any model controller of this approval configured to display quantity in kg units and flow rate in kg/min units.

The field of operation applicable to this variant is that for the system to which the controller is connected.

TEST PROCEDURE No S313A

Instruments shall be tested in accordance with any relevant tests specified in the national instrument test procedures.

Maximum Permissible Errors

The maximum permissible errors are specified in Schedule 1 of the *National Trade Measurement Regulations 2009*.

The maximum permissible shaft revolutions of the pulse generator and the maximum flow rate of the flowmetering system shall be considered in conjunction with any tests specified in the approval documentation for the instrument to which the pattern is connected, and in accordance with any relevant tests.

Recommended Procedures For Systems With Volume Conversion Facility Enabled

1. Instrument configured for displaying the metered volume at operating conditions and the volume at +15 °C is obtained indirectly.

(i) Verify the performance of the meter for the arm/line selected using the displayed metered volume at operating conditions (unconverted volume).

(ii) For each delivery use the Display function key to obtain and record the volume at +15 °C, the density setting and the average temperature for the delivery. Verify that the density setting is within ±1 kg/m_3, and the temperature is within ±0.5 °C.

(iii) For the displayed temperature and set density, use the appropriate Petroleum Tables to determine the volume conversion factor. Multiply the volume conversion factor and the unconverted volume to obtain the calculated volume at +15 °C.

The maximum permissible error between the calculated volume at +15 °C and the volume at +15 °C displayed by the instrument is ±0.1%.

2. Instruments configured for displaying the volume at +15 °C and the metered volume at operating conditions is obtained indirectly. Note: such systems (other than LPG) require the indicator to be marked ‘Volume at 15 °C or Litres at 15 °C’ or similar.

(i) Verify the performance of the meter for the arm/line selected by using the Display function key to obtain the metered volume at operating conditions (unconverted volume). Also for each delivery record the displayed volume at +15 °C, the displayed average temperature and the density setting of the metered liquid.

(ii) Check that the displayed temperature is within ±0.5 °C and the set density is within ±1 kg/m^3.

(iii) For each delivery measure the temperature and determine the density of the metered liquid. Using the appropriate Petroleum Tables, determine the volume conversion factor. Multiply the volume conversion factor by the unconverted volume to obtain the calculated volume at +15 °C. The maximum permissible error between the calculated volume at +15 °C and the volume at +15 °C displayed by the instrument is ±0.2%.

Note: The difference in maximum permissible error between method 1 and method 2 is that in method 1 the temperature and density is used as displayed by the instrument, whereas in method 2 the temperature and density is measured using traceable reference equipment.

FIGURE S313A – 1

Smith Meter Model 1010A Controller for Liquid-measuring Systems

FIGURE S313A – 2

Smith Meter Model 1010H Controller

FIGURE S313A – 3

Smith Meter Model 1010H Controller with Model 1010 Expansion Unit

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