



Australian Government

Department of Industry,  
Science and Resources

**National  
Measurement  
Institute**

36 Bradfield Road, West Lindfield NSW 2070

**Certificate of Approval**  
**NMI 5/6B/21B**

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 T-11 Bulk Flowmetering System

submitted by      Smith Meter Inc.  
1602 Wagner Avenue  
Pennsylvania 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 Measuring Systems for Liquids Other than Water, dated June 2011.

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 & variant 1 approved – certificate issued	21/12/04
1	Pattern amended ( <b>1.1 Field of Operation</b> ) – notification of change issued	24/08/06
2	Pattern & variant 1 reviewed – notification of change issued	20/08/10
3	Pattern & variant 1 updated & <b>reviewed</b> – certificate issued	3/11/16

## Document History (cont...)

Rev	Reason/Details	Date
4	Pattern amended (submitted by) – certificate issued	06/07/20
5	Pattern amended (model numbers) – certificate issued	14/03/22
6	Pattern amended (submitted by) – certificate issued	23/07/25

## CONDITIONS OF APPROVAL

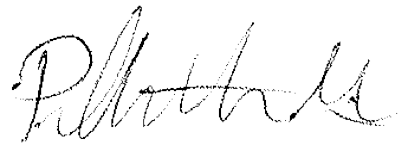
**General**

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 5/6B/21B' 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 NMI 5/6B/21B

### 1. Description of Pattern

**approved on 21/12/04  
amended on 14/03/22**

A bulk flowmetering system (Figure 1) incorporating a Smith Meter® model T-11 positive displacement flowmeter for bulk metering of petroleum products other than LPG.

Note: Flowmeter models may also be known as LT-11 or KT-11 models.

#### 1.1 Field of Operation

The field of operation of the measuring system is determined by the following characteristics:

• Minimum measured quantity, $V_{min}$	100 L	(#1)
• Maximum flow rate, $Q_{max}$	375 L/min	
• Minimum flow rate, $Q_{min}$	57 L/min	
• Maximum pressure of the liquid, $P_{max}$	1034 kPa	
• Minimum pressure of the liquid, $P_{min}$	50 kPa	(#2)
• Nature of liquids to be measured e.g. petrol, distillate		(#3)
• Kinematic viscosity range at 20 °C	0.4 to 20 mPa.s	(#4)
• Maximum temperature of the liquid, $T_{max}$	+50 °C	
• Minimum temperature of the liquid, $T_{min}$	-10 °C	
• Maximum ambient temperature	+55 °C	
• Minimum ambient temperature	-25 °C	
• Accuracy class	0.5	

(#1) The calculator/indicator indicates the volume at least in 0.1 L increments.

(#2) As specified for effective operation of the gas elimination device – refer also to clause 1.2 (iv) **Gas Elimination Device**.

(#3) Including a mixture of petrol and ethyl alcohol, **or pure biodiesel and biodiesel/distillate blends (to Australian government standard)**.

(#4) The flowmeter is adjusted to be correct for the liquid for which it is to be verified/certified as marked on the data plate.

#### 1.2 System Configuration

##### (i) Tank

A supply tank, which may incorporate a detector for low liquid-level and prevent measurements when the low liquid-level is reached.

##### (ii) Pump

A **positive displacement**, centrifugal and/or submersible turbine type pump may be used subject to the following requirements:

A centrifugal type pump may only be installed below the liquid level of the supply tank. A submersible turbine type pump may also be used either alone or supplying a centrifugal type pump positioned above or below the liquid level of the supply tank. These systems shall include a gas extractor near the inlet of the meter.

**A positive displacement pump is only installed in systems where the supply tank incorporates a low liquid-level detector.**

In any case, for all combination of usage, the pump shall be of sufficient capacity to ensure that each meter can operate over its approved flow rate range.

**(iii) Non-return Valve**

A non-return valve is fitted between the pump and the flowmeter to prevent reverse flow of the liquid.

**(iv) Gas Elimination Device**

A Smith Meter Inc model T2A gas extractor (Figure 2) with integral strainer (or any other equivalent approved gas elimination device) is fitted immediately upstream of the meter. The gas extractor is approved on the condition that the pump is operated under positive suction head.

For systems incorporating the Smith Meter Inc model SP2S flow control valve with air sense control system (Figure 2) the vent of the T2A gas extractor is connected to the SP2S valve which restricts the flow until any air detected has been vented. For such systems the minimum pressure  $P_{\min} = 200 \text{ kPa}$ .

For applications where the duration of the shut-down period does not cause thermal contraction of the liquid and formation of pockets of gas upstream of the meter, the gas elimination device may be modified for use as a strainer only.

**(v) Measurement Transducer**

A Smith Meter Inc model T-11 50 mm (2 inch) positive displacement flowmeter (Figure 2) with a mechanical output shaft connected to a calibration mechanism with an output shaft that can be adjusted to rotate proportional to the volume throughput.

The calibrator dial allows calibration adjustment in increments of 0.05% and is concealed under a wire sealed cover. The dial rotation in the plus (+) direction will decrease the registration, and rotation in the negative direction (-) it will increase the registration.

The calibration mechanism may be replaced with a compatible approved electronic pulse output device for use with a compatible approved electronic calculator/indicator.

The meter is adjusted (verified/certified) using the liquid it is intended to measure.

Provision is made for inserting a thermometer and fitting a pressure gauge for the purpose of verifying/certifying the meter. The thermometer well and the pressure gauge may be fitted in the vicinity of the meter outlet. Alternatively, the thermometer well may be incorporated in the gas elimination device if the device is in close proximity of the meter inlet.

**(vi) Calculator/Indicator**

The output shaft from the calibration mechanism is connected to an approved Veeder-Root mechanical calculator/indicator (as described in the documentation of NSC approval No S184B) or any other compatible approved calculator/indicator.

Note: Only Veeder-Root mechanical printers with the capability to print the units of measurement are approved.

To facilitate the deliveries, a pre-set mechanism may be fitted between the mechanical calculator/indicator and the flowmeter provided the pre-set device is marked "Pre-set Amount Not for Trade Use" or similar wording. The pre-set device is mechanically linked to a Smith Meter Inc model SP2S flow control valve to automatically stop the delivery. Upon completion of delivery, the volume delivered is displayed by the calculator/indicator, which may differ from the pre-set amount.

The Veeder-Root mechanical register and the pre-set device may be replaced with any other compatible approved calculator/indicator and pre-set device.

### (vii) Transfer Device

The transfer device is located downstream of the flowmeter and clearly defines the start and stop of the measured quantity. The transfer device is a Smith Meter Inc model SP2S flow control valve (Figures 1 and 2) or other positive shut-off component, such as a manually or automatically-operated control valve, located downstream of the meter with no intermediate outlet. Whatever the transfer device used, the pipework upstream of the transfer device shall be maintained full of liquid.

## 1.3 Descriptive Markings and Notices

Each measuring system shall bear the following information, placed together either on the indicating device or on a data plate:

•	Pattern approval mark	NMI 5/6B/21B
•	Manufacturer's name or mark	...
•	Meter model	... (#1)
•	Serial number	...
•	Year of manufacture	... (#2)
•	Maximum flow rate, $Q_{max}$	... L/min
•	Minimum flow rate, $Q_{min}$	... L/min
•	Maximum pressure of the liquid, $P_{max}$	..... kPa
•	Minimum pressure of the liquid, $P_{min}$	..... kPa
•	Nature of the liquids to be measured	..... (#3)
•	Reference currents:	$I_b$ ... A
•	Environmental class	class C

(#1) Meter models may also be marked with either a letter L or K of the first character. The letter "L" indicates models in "Litres" and letter "K" represents product catalog codes.

(#1) May be combined with the serial number.

(#2) This may be located separately, e.g. on a metal tag sealed to the instrument.

The minimum measured quantity ( $V_{min}$ ) is clearly visible on the indicating device, e.g. "Minimum Delivery 100 L".

## 1.4 Verification Provision

Provision is made for the application of a verification mark.

## 1.5 Sealing Provision

Provision is made for sealing the following components:

- The covers of the meter housing;
- The calibrating mechanism; and
- The indicating mechanism and pre-set mechanism (if fitted).

The calibration adjustment provided by any compatible approved calculator/indicator should be sealed as described in its approval documentation.

## **2. Description of Variant 1**

**approved on 24/12/04**

A Smith Meter Inc model T-20 75 mm (3 inch) flowmeter (Figure 3) having a maximum and minimum flow rate of 750 L/min and 75 L/min, respectively. The minimum delivery is either 100 L for instruments incorporating a calculator/ indicator with a resolution of 0.1 L, or 500 L where the calculator/indicator has a resolution of 1 L.

Note: Flowmeter models may also be known as LT-20 or KT-20 models.

The meter is fitted with a Smith Meter Inc model T3A gas elimination device or other approved device. The transfer device is a Smith Meter Inc model SPG3 valve (Figure 3) or other positive shut-off component, such as a manually or automatically-operated control valve, located downstream of the meter with no intermediate outlet.

### **TEST PROCEDURE**

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

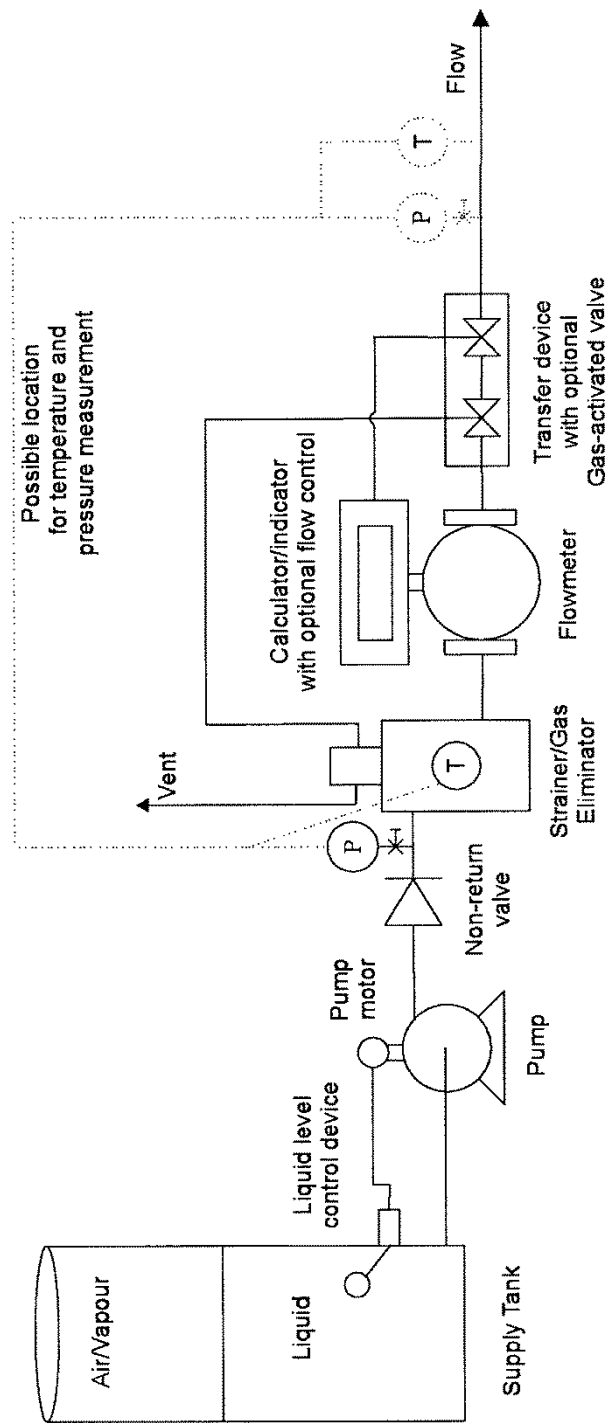
The instrument shall not be adjusted to anything other than as close as practical to zero error, even when these values are within the maximum permissible errors.

A suitable Test Procedure may be obtained from NMI

### **Maximum Permissible Errors**

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

FIGURE 5/6B/21B – 1



Typical Smith Meter Inc Bulk Flowmetering System

FIGURE 5/6B/21B – 2



Smith Meter Inc Model T-11 Flowmeter With Veeder-Root Indicator, Printer, Pre-set and Air Sense System Control

FIGURE 5/6B/21B – 3



Smith Meter Inc Model T-20 Flowmeter With Veeder-Root Indicator, Printer, Pre-set and Air Sense System Control