



Australian Government
Department of Industry,
Innovation and Science

National Measurement Institute

Interim Certificate of Approval NMI 9/2/5

VALID FOR VERIFICATION PURPOSES UNTIL 19 NOVEMBER 2016

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.

FMC Model Sening MultiLevel Vehicle Tank Measuring System

submitted by John Bean Technologies
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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 80-1 Road Tankers with Level Gauging, Part 1 Metrological and Technical Requirements and Part 2 Metrological and Technical requirements, dated November 2014.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern provisionally approved – interim certificate issued	13/06/14
1	Pattern amended (validity) – interim certificate issued	30/01/15
2	Pattern amended (validity, etc.) – interim certificate issued	29/07/15
3	Pattern approved – interim certificate issued	19/11/15

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 9/2/5' and only by persons authorised by the submitter.

Instruments purporting to comply with this approval and currently marked 'NMI P9/2/5' may be re-marked 'NMI 9/2/5' but 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.

1. Description of Pattern provisionally approved on 13/06/14 approved 19/11/15

An FMC model Sening MultiLevel road and rail tanker with level gauging system approved for measuring the quantity of the liquid hydrocarbon products other than LPG in the tank/compartments.

1.1 Field of Operation

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

- | | | |
|---|--------------------------------------|---|
| • | Minimum measured quantity, V_{min} | 200 L (#1) |
| • | Capacity of road tanker | 0.5 m ³ to 50 m ³ |
| • | Capacity of rail tanker | 10 m ³ to 120 m ³ |
| • | Inclination | ±5° |
| • | Dynamic viscosity, η (at 20°C) | 0.4 to 20 mPa.s (#2) |
| • | Liquid temperature range | −10°C to 50°C |
| • | Ambient temperature range | −25°C to 55°C |
| • | Voltage of road vehicle battery | 15 or 30 VDC (nominal) |
| • | Accuracy class for system | Class 0.5 |
| • | Applications | Road and rail tankers |
- (#1) V_{min} - This value depends on the actual test results of each instrument; accuracy to be within 0.3% of batch volume.
- (#2) The system is adjusted to be correct for the liquid for which it is to be verified as marked on the data plate.

1.2 Software Versions

The metrologically relevant software modules are as follows:

Component/type	Software Version	CRC Checksum	
		EPROM	Flash-Memory
MLMAINDISP(X)	1.25 [---] (#)	0299ECFB	77028A8A
MLIF	1.11	n/a	
NM2WET	1.13	n/a	

(#) [---] is the non-metrological relevant portion of the software

1.3 The System

This automatic tank gauging system measures the level in a horizontal tank, with compensation for the angle of inclination, in x and y direction in respect of horizontal.

The system is intended for volume measurement on a tanker. During normal operation, the volume is displayed on the calculator/indicator; this volume is derived from the measured level in the compartment and pipework; all product after the external valve (API coupling) is deemed to be the delivered quantity – this can be achieved gravity or pumped discharge.

Apart from the product volume at delivery temperature, on the basis of standard conversion methods the product volume at reference product temperature may also be viewed displayed.

1.4 Components of the Measuring System

The system includes:

A tank which may have a number of compartments, and which is designed to comply with NMI General Certificate 9/0/B for Vehicle Tanks of Capacities 0.5 to 105 kilolitres.

The MultiLevel is powered by the tank truck battery (16 to 32 V DC, 24 V nominal) as the power supply.

A Sening MLDSBO-XXXX series electronic dipstick and a model MLIF dipstick interface. (XXXX defines the length of the dipstick.)

A Sening model MLDTS-2 temperature sensor.

A Sening model MLIS inclination sensor.

A Sening model MultiLevel MLMAINDISP(X) calculator/indicator unit with a graphic-capable liquid crystal type display. For the purpose of meter verification the calculator/indicator has provision for displaying the delivery of liquid in litres.

An optional Epson model TM-U220 or to any other equivalent (*) printer.

(*) 'Equivalent' is defined to mean other proprietary equipment of the same or better specifications requiring no changes to the software specified in this approval for satisfactory operation of the complete system.

1.5 Calculator/Indicator

A Sening model MultiLevel MLMAINDISP(X) calculator/indicator unit with a graphic-capable liquid crystal type display. For the purpose of meter verification the calculator/indicator has provision for displaying the delivery of liquid in litres.

TEST PROCEDURE

The measuring system can be verified using the procedures given in the NMI documents NITP 9 *National Instrument Test Procedures for Vehicle Tanks* and General Certificate 9/0/B *Vehicle Tanks of Capacities 0.5 to 105 kilolitres*.

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.

The maximum permissible errors, that is, the difference between the volume transferred as indicated by the instrument and the transferred volume measured using traceable equipment, are:

$\pm 0.5\%$ for the measuring system (in-service inspection); and

$\pm 0.3\%$ during calibration adjustment of the instrument.

The verification may be carried out by either delivering a traceable volume into the tank compartment, or alternatively by dispensing the liquid from the tank compartment via traceable volume measuring equipment.

Within the field of operation, the reference equipment must be able to measure the volume at any level in the-tank compartment with sensitivity at least three times better than a volume equivalent to ± 1 mm change in liquid level.

Up to 200 calibration points can be entered to define the tank profile (height versus volume). The tank profile shall be determined at an appropriate number of intervals to ensure that for contents in the tank greater than $2 \times$ minimum measured quantity, the interpolated volume between two adjacent calibration points is within 0.3%.

For each tank, the calibration points shall include the minimum liquid level (rounded up to the nearest 10 L) and the maximum liquid level (rounded down to the nearest 10 L). These maximum and minimum volumes for each tank/compartment shall be indicated to the user as the operating range of the instrument.

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



Dr A Rawlinson

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