



Australian Government
Department of Industry,
Innovation and Science

National Measurement Institute

Certificate of Approval

NMI 10/2/18

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.

ISOIL Model SBM 75 LPG Flowmetering System

submitted by ISOIL IMPIANTI SPA
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ITALY

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, July 2011.

This approval becomes subject to review on 1/03/21, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern approved – interim certificate issued	4/02/16

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 10/2/18' 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*.

A handwritten signature in black ink, appearing to read 'A Rawlinson', with a horizontal line underneath.

Dr A Rawlinson

TECHNICAL SCHEDULE No 10/2/18

1. Description of Pattern **approved on 4/02/16**

An ISOIL model SBM 75 LPG flowmetering system (Figure 1).

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
• Maximum flow rate, Q_{max}	380 L/min
• Minimum flow rate, Q_{min}	76 L/min
• Maximum pressure of the liquid, P_{max}	2000 kPa
LPG density range (at 15°C)	505 to 580 kg/m ³ (#)
LPG liquid temperature range	-20°C to 50°C
Ambient temperature range	-25°C to 55°C
Accuracy class	Class 1.0
Maximum operating pressure (P_{max})	2000 kPa
Minimum operating pressure (P_{min})	at least 100 kPa above vapour pressure

The system is approved for vehicle-mounted installations as an interruptible measuring system (see clause **1.2 (x) Transfer Device**).

(#) Within the density range specified, the calculator/indicator is required to be manually set for the density of LPG being metered.

1.2 Components of Measuring System

(i) Supply Tank

The supply tank has a bottom outlet larger than the pump outlet and has at least one return line fitted to the vapour space of the tank. A return line is required for the gas elimination device and for verification of the metering system.

(ii) Pump

Either a positive displacement or centrifugal pump, with integral or external pump bypass valve, is positioned as close as possible to the outlet of the supply tank. The pipe from the supply tank has a continuous fall to the pump inlet and has a diameter not smaller than that of the pump outlet pipe.

(iii) Vapour Elimination Device

The pattern is fitted with an ISOIL FDA (*) series (Figure 2) or other compatible (#) strainer/air eliminator.

(*) Abbreviated model number – the full model number may include a numeric suffix, e.g. FDA 400.

(#) ‘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.

(iv) Temperature Transducer

An ISOIL model PT100/BT or equivalent (*) temperature probe (Pt 100) is fitted to the flowmetering system.

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

(v) Measurement Transducer

The measurement transducer is an ISOIL model SBM 75 positive displacement meter fitted with an ISOIL ENCODER EM 6422 (**) series pulse generator (Figure 3) or other compatible (#) NMI-approved pulse generator. Liquid enters the meter through the inlet side of the manifold and causes the rotors to rotate within the measuring chamber displacing a fixed volume of liquid for each cycle. The pulse generator provides a pulse output proportional to the volume throughput, and has the following characteristics:

Pulse transmission:

Input supply voltage	5 to 30 VDC
Pulse resolution	64 or 256 pulses/revolution
Maximum speed	1000 rpm

- (**) Abbreviated model number – the full model number may include a numeric suffix, e.g. 6422 1111.

(vi) Differential Pressure Valve

A DPV model 6301 differential pressure valve (Figure 4a) or an ISOVALVE differential pressure valve (Figure 4b) is installed downstream of the meter to maintain the LPG in liquid phase and allow flow when the pressure of LPG at the meter is at least 100 kPa above its vapour pressure. The vapour side of the pressure differential valve is connected to the vapour space of the supply tank via the vapour return line.

Provision is made for a pressure gauge to be fitted between the differential pressure valve and the meter.

(vii) Calculator/Indicator

An ISOIL model VEGA II (Figure 5a) or model VEGA T calculator/indicator (Figure 5b) or other compatible (#) NMI-approved calculator/indicator. The model VEGA units have a graphics display and numerical/function soft/hard keys housed in an aluminium enclosure, or any other compatible (#) approved mechanical or electronic calculator/indicator that incorporates electronic volume conversion for temperature facility to indicate the delivered volume of LPG at 15°C. The density of LPG is manually entered into the calculator/indicator. The meter non-linearity correction facility may be enabled to reduce the meter error as a function of flowrate.

- (#) '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.

For minimum measured quantities less than 200 L, the resolution of the calculator/indicator is set to display the delivered volume in 0.1 L increments.

(viii) Printer

An Epson model TM-U295 or equivalent (*) slip printer is required to be interfaced to the calculator/indicator for systems with the temperature compensation facility enabled for indicating the delivered volume at 15°C and where the density is operator selectable.

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

(ix) Transfer Device

The transfer point that defines the start and stop of measurement is either a valve or an LPG nozzle fitted to a pipe/hose connected to the outlet of the differential pressure valve with no intermediate connections that may divert the delivery. However, two delivery outlets may be installed provided an isolation valve is fitted before each delivery outlet and that one or more notices are fitted near each isolation valve/delivery outlet indicating that only one outlet is to be in use at any one time.

The LPG metering system is considered an interruptible system where the valve/nozzle is latched in the open position for the duration of the delivery; in addition, an operator monitors the entire delivery process and responds to any alarms given by the metering system.

1.3 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
Meter model
Serial number
NSC approval number	NMI 10/2/18
Year of manufacture
Minimum flow rate	76 L/min
Maximum flow rate	380 L/min
Density range at 15°C	505 to 580 kg/m ³
Nominal k-factor (pulses/litre)
Environmental classes	Class C, I (#)
Accuracy class	1.0
Maximum operating pressure kPa
Minimum operating pressure	at least 100 kPa above vapour pressure

In addition, the indicator is marked with the minimum delivery (V_{min}) specified for the metering system.

Instruments fitted with more than one delivery outlet must have one or more notices fitted near each isolation valve/delivery outlet indicating that only one outlet is to be in use at any one time.

- (#) Both these classes represent the same ambient temperature range of -25°C to 55°C but class I is for mobile systems.

1.4 Verification Provision

Provision is made for the application of a verification mark.

1.5 Sealing Provision

The vapour eliminator (Figure 2), calculator/indicator (Figure 6), and pulse generator (Figure 7) have provision for sealing.

TEST PROCEDURE No 10/2/18

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

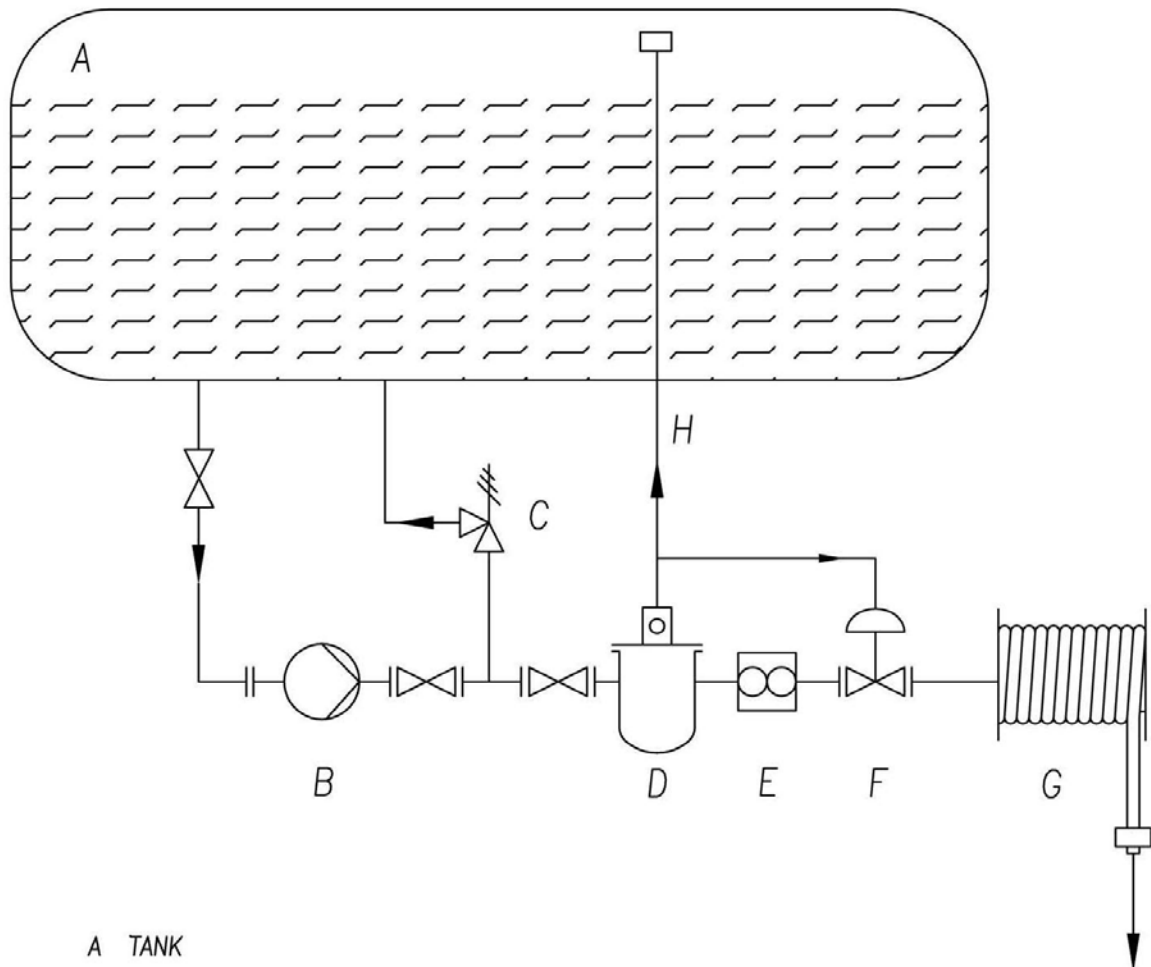
The instrument shall not be adjusted to anything other than as close as practical to zero error, even when these values are within the maximum permissible errors.

The tests should be conducted in conjunction with any test specified in the approval documentation for any devices used with this metering system.

Maximum Permissible Errors

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

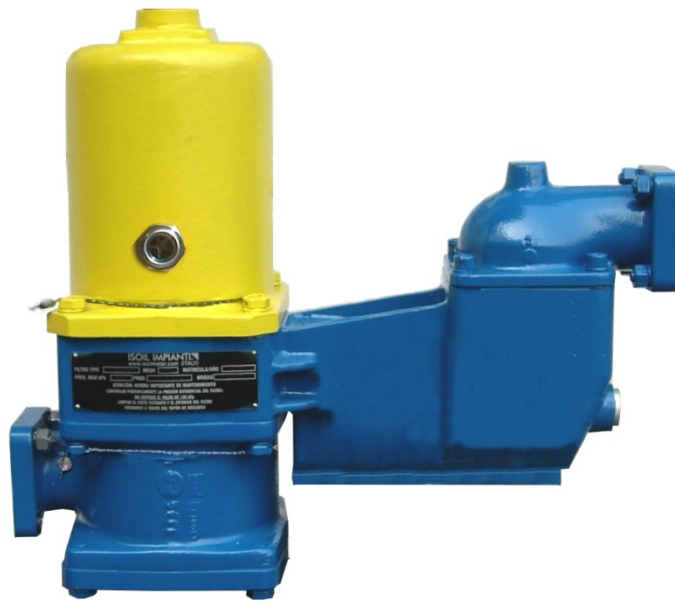
FIGURE 10/2/18 – 1



- A TANK
- B PUMP
- C PUMP BYPASS VALVE
- D VAPOUR ELIMINATOR
- E METER
- F DIFFERENTIAL PRESSURE VALVE
- G HOSE REEL
- H VAPOUR RETURN LINE

Typical ISOIL Model SBM 75 LPG Flowmetering System

FIGURE 10/2/18 – 2



ISOIL FDA Series Strainer/Air Eliminator (incl. Typical Sealing)

FIGURE 10/2/18 – 3



ISOIL Model SBM 75 Flowmeter With ISOIL Model VEGA T Indicator, ISOIL FDA Series Strainer/Air Eliminator and DPV Model 6301 Differential Pressure Valve

FIGURE 10/2/18 – 4



(a) DPV Model 6301 Differential Pressure Valve



(b) ISOVALVE Differential Pressure Valve

FIGURE 10/2/18 – 5

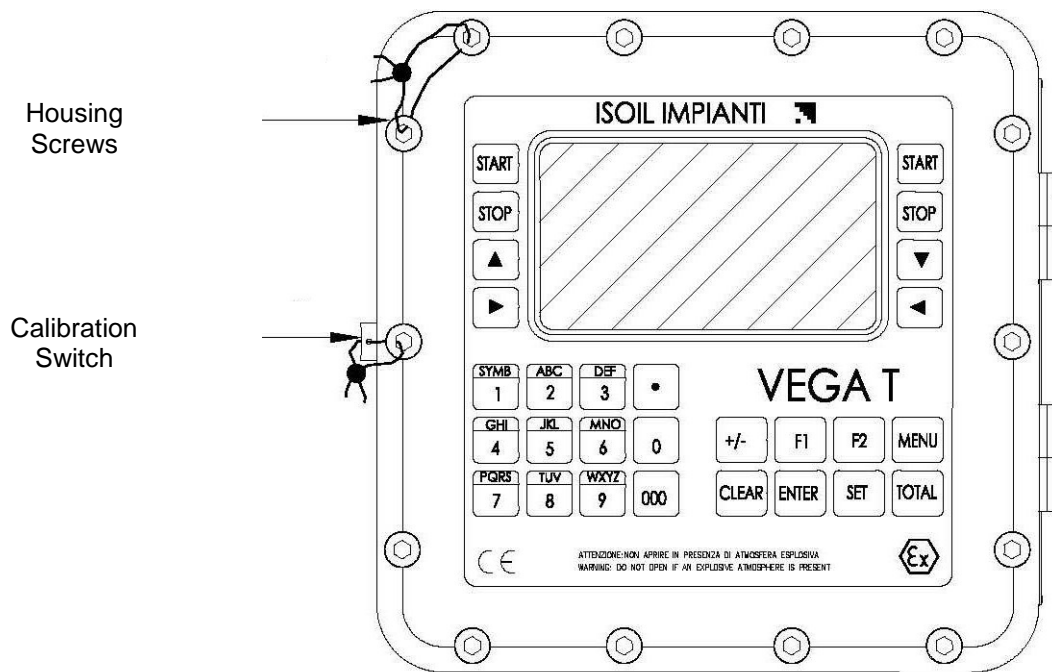


(a) ISOIL Model VEGA II Calculator/Indicator



(b) ISOIL Model VEGA T Calculator/Indicator

FIGURE 10/2/18 – 6



Typical Sealing of Model VEGA T Calculator/Indicator

FIGURE 10/2/18 – 7



Typical Sealing of Pulse Generator