



Australian Government
Department of Industry,
Innovation and Science

National Measurement Institute

36 Bradfield Road, West Lindfield NSW 2070

Certificate of Approval NMI 10/2/22

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.

Alderley LPG Loading/Transfer Flowmetering System

submitted by Alderley Systems Ltd
Kingfisher House, Arnolds Field Estate
The Downs, Wickwar, GL12 8JD, United Kingdom

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, June 2011.

This approval becomes subject to review on 1/06/24, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variant 1 approved – interim certificate issued	8/02/19
1	Amended - 1.1 Field of Operation – increased Liquid temperature range: -45°C to 50°C	23/04/19

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 10/2/22' 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*.



Darryl Hines
Manager
Pattern Approval, Policy and
Licensing Section

TECHNICAL SCHEDULE No 10/2/22

1. Description of Pattern

approved on 8/02/19

An Alderley LPG Loading/Transfer Bulk LPG Mass flowmetering system using any model of the Emerson Micro Motion series for the bulk metering of LPG (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} (*) 2000 L
- Maximum flow rate, Q_{max} 3330 m³/h
- Minimum flow rate, Q_{min} 240 m³/h
- Maximum pressure of the liquid, P_{max} 1000 kPa
- LPG density range (at 15°C) 570 to 600 kg/m³ (#)
- LPG liquid temperature range -45°C to 50°C
- Ambient temperature range -25°C to 55°C
- Accuracy class Class 1.0
- Maximum operating pressure (P_{max}) 1900 kPa
- Minimum operating pressure (P_{min}) at least 100 kPa above vapour pressure

(*) For minimum measured quantities (V_{min} or M_{min}) less than or equal to 200 kg, the resolution of the calculator/indicator is set to display the delivered volume in 0.1 L increments.

(#) 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

To ensure air does not enter the pipework, the supply tank incorporates a Rosemount model TGU 53 level transmitter or equivalent (**) for detecting low liquid level (Figure 2). The transmitter will stop the delivery if activated.

(**) '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 system.

(ii) Pump

A positive displacement, centrifugal or submersible turbine type pump may be used to provide flow through one or more flowmeters. The pump is fitted in a positive suction head (flooded suction) installation, i.e. below the liquid level in the supply tank.

For all combination of usage, the pump(s) shall be of sufficient capacity to ensure that each flowmeter can operate within its approved flow rate range.

(iii) Gas Elimination Device

A gas elimination device need not be fitted as the flow metering system is designed to keep the pipework full of liquid at all times, and on the occasion that small amounts of vapour may form in the pipework, the mass of this vapour will be insignificant compared to the mass of liquid.

(iv) Measurement Transducer

The measurement transducer of the pattern comprises a Micro Motion Elite CMFHC3 series of flow sensors interfaced to a Micro Motion model 2700 microprocessor-based transmitter designed to provide pulse output signal proportional to the mass throughput. The transmitter is connected to an AC or DC power supply.

(v) Temperature Transducer

An Emerson temperature transmitter model 3144P PT100 Class A (plus shield) RTD probe is fitted to the gas extractor which also has a thermometer well for verifying the measured temperature of LPG, or any other compatible (#) temperature probe with similar characteristics.

(*) '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.

(vi) Differential Pressure Valve

An Orton MV control valve or any compatible pneumatically operated flow control valve is installed downstream of the meter. These are to maintain a back pressure during master metering operations and can also be used to ensure liquid phase in the Coriolis meters.

The flow control valve is located downstream of the measurement transducer (Figure 3).

Provision is made for an indicating pressure transmitter to be fitted between the differential pressure valve and the meter.

(vii) Calculator/Indicator

The signal output from the measurement transducer is interfaced to an approved Emerson process Flowboss model S600 as described in the documentation of approval NMI S774 or any other compatible (#) NMI-approved calculator/indicator.

(#) '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.

(viii) Transfer Device

A transfer device, which defines the start and stop of the quantity measured, is installed downstream of the flow sensor. The transfer device is in the form of a positive shut-off component such as a manually or automatically-operated shut-off valve.

The transfer device may also be designed to control the flow rate within the specified flow rate range of the flowmeter.

1.3 Verification Provision

Provision is made for the application of a verification mark.

1.4 Sealing Provision

The calculator/indicator has provision for sealing access to the calibration parameters.

1.5 Descriptive Markings and Notices

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

Manufacturer's identification mark or trade mark
Meter model
Serial number of the instrument
Pattern approval mark	NMI 10/2/22
Year of manufacture
Maximum flow rate, Q_{max} m ³ /h
Minimum flow rate, Q_{min} m ³ /h
Maximum pressure of the liquid, P_{max} kPa
Type of the liquid for which the system is verified (##)
Environmental class	Class C

(##) 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 1000 L', or alternatively the controller/indicator is programmed for deliveries equal to or greater than the stated minimum delivery.

TEST PROCEDURE

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

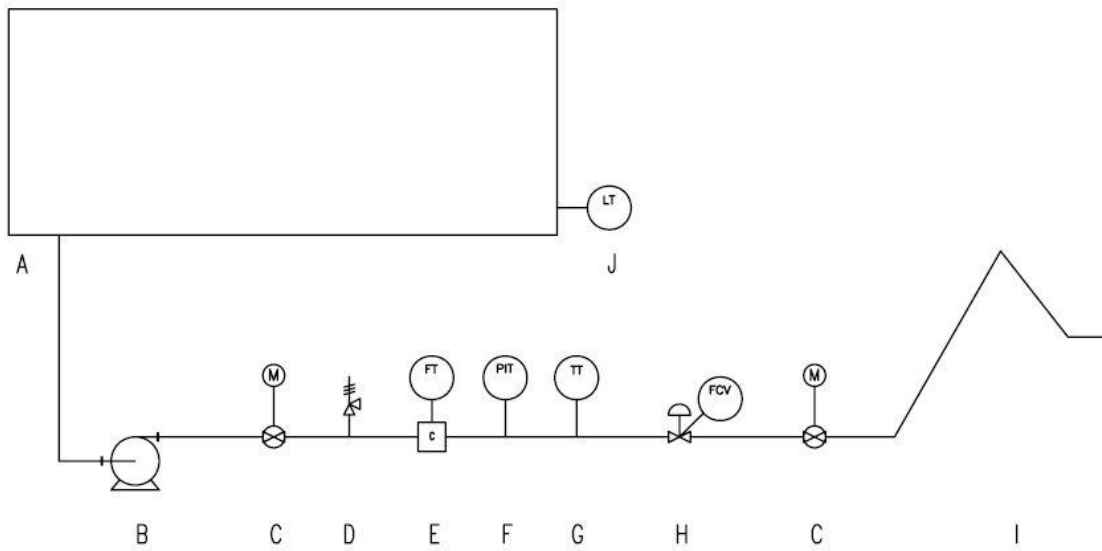
Tests should be conducted in conjunction with any tests specified in the approval documentation for any controller/indicator and/or any conversion device, etc. used.

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 are specified in Schedule 1 of the *National Trade Measurement Regulations 2009*.

FIGURE 10/2/22 – 1



- A TANK
- B PUMP
- C MOTOR OPERATED VALVE
- D RELIEF VALVE
- E CORIOLIS METER
- F PRESSURE TRANSMITTER
- G TEMPERATURE TRANSMITTER
- H FLOW CONTROL VALVE
- I LOADING ARM
- J LEVEL TRANSMITTER

Typical LPG Flowmetering System

FIGURE 10/2/22 – 2



Rosemount TGU 53, Tank Radar Gauge, Still Pipe Antenna for LNG Level transmitter

FIGURE 10/2/22 – 3



Orton MV control valve

~ End of Document ~