

# National Standards Commission



## Certificate of Approval

**No 10/2/5**

Issued under Regulation 9  
of the  
National Measurement (Patterns of Measuring Instruments) Regulations

This is to certify that an approval for use for trade has been granted in respect of the

Micro Motion Model D40 LPG Mass Flowmetering System

submitted by Rosemount Instruments Pty Ltd  
471 Mountain Highway  
Bayswater VIC 3153.

**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.

### CONDITIONS OF APPROVAL

This approval is subject to review on or after 1/8/97.  
This approval expires in respect of new instruments on 1/8/98.

Instruments purporting to comply with this approval shall be marked NSC No 10/2/5 and only by persons authorised by the submittor.

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 Commission 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 the Commission's Document 106.

The Commission reserves the right to examine any instrument or component of an instrument purporting to comply with this approval.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate No S1/0/A.

#### DESCRIPTIVE ADVICE

**Pattern:** approved 3/7/92

- A Micro Motion model D40 mass flowmetering system for liquefied petroleum gas.

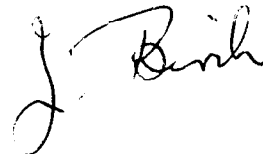
Technical Schedule No 10/2/5 describes the pattern.

#### FILING ADVICE

The documentation for this approval comprises:

Certificate of Approval No 10/2/5 dated 20/9/93  
Technical Schedule No 10/2/5 dated 20/9/93 (incl. Test Procedure)  
Figures 1 and 2 dated 20/9/93

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.





## National Standards Commission

### TECHNICAL SCHEDULE No 10/2/5

**Pattern:** Micro Motion Model D40 LPG Mass Flowmetering System.

**Submitter:** Rosemount Instruments Pty Ltd  
471 Mountain Highway  
Bayswater VIC 3153.

#### 1. Description of Pattern

- A bulk flowmetering system using a Micro Motion model D40 mass flowmeter which is approved for the delivery of liquefied petroleum gas at flow rates between 40 kg/min and 8 kg/min. The minimum quantity is 10 kg.

##### 1.1 Flowmetering System (Figures 1 and 2)

The flowmetering system may be mounted on a vehicle or in a transportable module. The system (Figure 2) comprises the components listed below.

##### (i) Supply Tank

A supply tank located above the pump. A low-level detection device may be fitted.

##### (ii) Pump

The pump is positioned as close as possible to the supply tank. The inlet pipe to the pump is the same size or larger than the outlet and has a continuous fall to the pump. A strainer may be fitted in the pipeline between the supply tank and the pump.

If the pump is not for the exclusive use of the flowmeter the flow rate through the meter must stay within the appropriate flow rate range for all combinations of alternative uses of the pump.

##### (iii) Gas Purger

The meter is protected from the measurement of vapour by correct installation and by a Schlumberger (Neptune), or Liquid Controls, 38 mm float-operated gas purger (Figure 2) with integral strainer. A larger capacity gas purger may be used. A thermometer well is situated in the strainer cover.

The gas purger is vented through a non-return valve, via a vapour return line not less than 20 mm in diameter to the vapour space of the supply tank.

**(iv) Meter (Figure 1)**

A Micro Motion model D40 10 mm mass flowmeter being a flow sensor comprising two 'U'-shaped tubes in an hermetically-sealed housing.

**(v) Indicating System (Figure 1)**

A Micro Motion model RFT9712 remote electronic flow transmitter and a Micro Motion model DRT digital indicator.

**(vi) Pressure Differential Valve**

A Schlumberger (Neptune) spring-loaded diaphragm, or Liquid Controls spring-loaded piston or spring-loaded diaphragm, pressure differential valve maintains a pressure of at least 100 kPa above the vapour pressure at the measuring element to prevent the formation of vapour. A pressure-equalising pipe is connected from the differential valve to the supply tank, through the vapour return line from the gas purger vent.

**(vii) Outlet Piping/Transfer Device**

The pipe from the meter/pressure differential valve to the outlet has provision for a pressure gauge and is fitted with a non-return valve, and a control valve. A flow rate control valve may also be fitted.

If fitted with a delivery hose it shall comply with the SA code for hoses in use with liquefied petroleum gases. A shut-off device is fitted on the end of the hose.

The control valve/shut-off device is the transfer device for the measurement.

**1.2 Description of Components**

**1.2.1 Meter (Figure 1)**

The Micro Motion model D40 mass meter (flow sensor) determines mass flow by measuring the effects of Coriolis forces on a pair of 'U'-shaped tubes, which are vibrated at their natural frequency by an electromagnetic drive system. Relative motion between the two tubes is detected by electromagnetic sensors located on each side of the tubes. The sensors send information to the remote flow transmitter.

**1.2.2 Flow Transmitter (Figure 1)**

The Micro Motion model RFT9712 remote electronic flow transmitter processes and converts low-level signals from the meter (flow sensor) into digital and analogue outputs proportional to mass flow rate. The transmitter also generates an oscillatory voltage which causes the 'U' tubes to vibrate.

The flow transmitter, in conjunction with the flow sensor, forms the mass metering system. The flow transmitter is equipped with the following features:

- Primary zero adjustment to set 'no flow' conditions;
- Span selection adjustment;
- Time constant adjustment for meter response time;
- Frequency range selection adjustment to set the appropriate flow rates; and
- Output selection facility to select output in mA.

It may also be fitted with a four-line digital display, but this can only be used in addition to the DRT indicator.

### 1.2.3 Indicator (Figure 1)

The Micro Motion model DRT digital rate totaliser accepts the pulse output proportional to mass flow from the flow transmitter and totalises the mass. It then displays the mass and the mass flow rate.

The indicator is equipped with the following features:

- 4 1/2 digit LCD rate display;
- 8 digit LCD total mass display with units in kg;
- Time constant adjustment from 0.26 seconds to 10 seconds;
- Timebase compensator;
- Totaliser reset push-button; and
- An optional computer and interface.

The digital indicator accepts input signals at a rate of up to 20 kHz at 1 to 15 volts peak (input high).

## 1.3 Markings

Instruments are marked with the following data, together in the one location:

Manufacturer's name or mark	
Meter model	
Serial number	
NSC approval number	10/2/5
Maximum flow rate	40 kg/min
Minimum flow rate	8 kg/min
Nominal flow rate	(when flow rate is within ±5% of nominal)
	..... kg/min
Minimum quantity	10 kg
Approved for LPG of density range	0.500 to 0.580 kg/L
Maximum operating pressure	2500 kPa

#### **1.4 Sealing and Verification/Certification Provision**

Provision is made for sealing the calibration functions of the flow transmitter and the indicator. Provision is also made for a verification/certification mark to be applied.

#### **TEST PROCEDURE**

Instruments should be tested with the liquid with which they will be used and which is marked on the data plate.

#### **Maximum Permissible Errors at Verification/Certification**

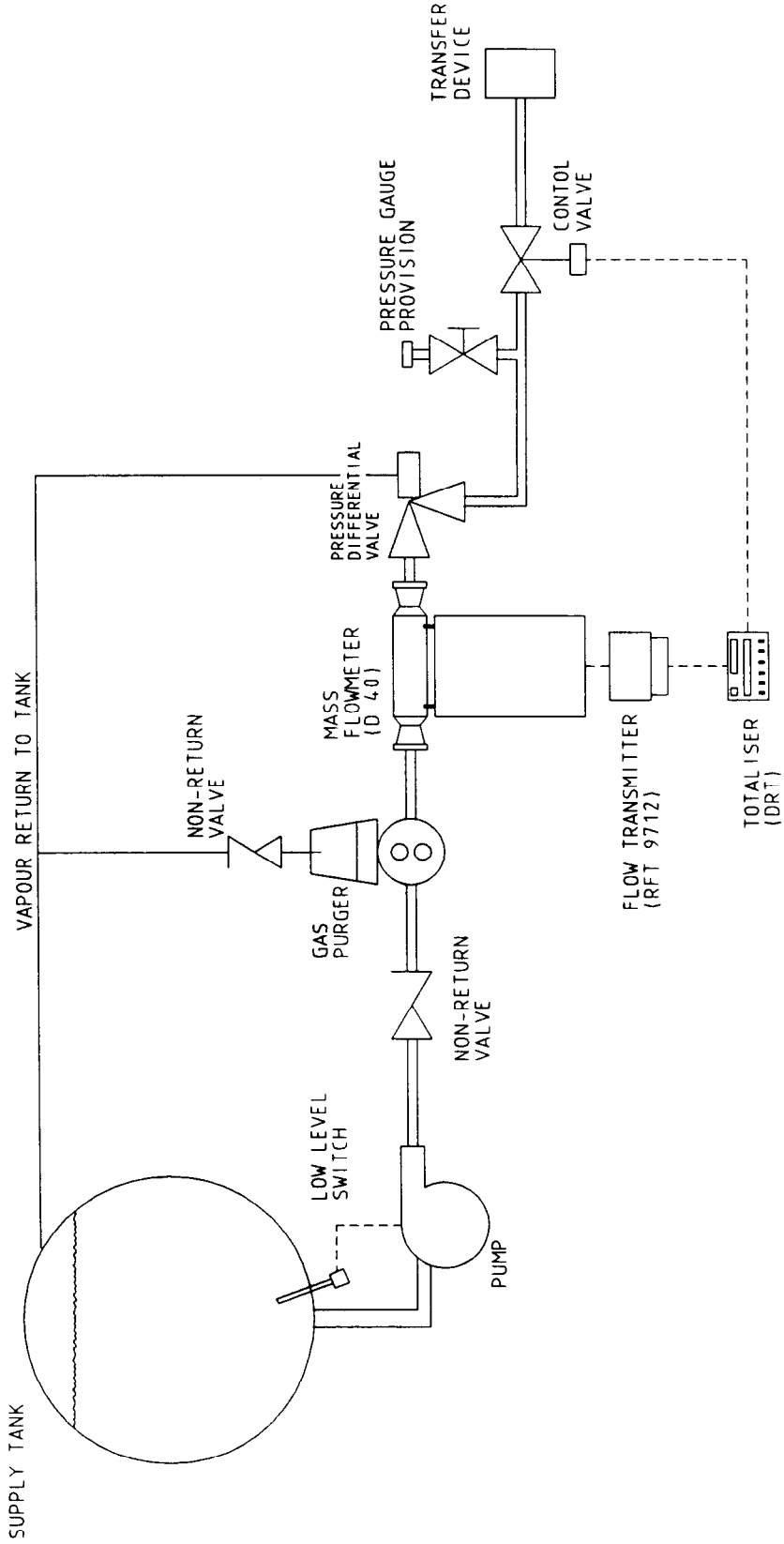
The maximum permissible error applied during a verification test from normal flow rate to the minimum flow rate specified in the Certificate of Approval or Technical Schedule is  $\pm 1.0\%$ .

FIGURE 10/2/5 - 1



Micro Motion D40 Mass Flowmetering System  
Showing Meter, Flow Transmitter and Indicator

FIGURE 10/2/5 - 2



Typical Bulk LPG Mass Flowmetering System