Australian Government
Department of Industry, Innovation and Science

National Measurement Institute

Certificate of Approval

NMI 5/6E/23

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.

Smarta Industrial Model MC104 Vehicle-Mounted Milk Flowmetering System

submitted by Smarta Industrial Pty Ltd
25 Samford Road
Alderley QLD 4051

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 becomes subject to review on **1/06/22**, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variant 1 approved – certificate issued	9/05/17

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number ‘NMI 5/6E/23’ 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 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*.

Dr A Rawlinson

TECHNICAL SCHEDULE No 5/6E/23

1. Description of Pattern approved on 9/05/17

A Smarta Industrial model MC104 vehicle-mounted milk flowmetering system using a Proces-Data model PD340-C76 electromagnetic flowmeter (Figure 1,2 and Table 1) approved for measuring the milk collected from a milk tank.

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
- Maximum flow rate (Q_{max}) 2000 L/min
- Minimum flow rate (Q_{min}) 200 L/min
- Maximum pressure of the liquid (P_{max}) 800 kPa
- Ambient temperature range -25°C to 55°C
- Accuracy class 0.5
- Vehicle-mounted operation
- Product – milk at nominal controlled temperature

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

1.2 The System (Figure 1)

(i) A supply tank

The supply tank is a milk tank or a vat to which the metering system is temporarily connected to the “Milk In” connection on Fig. 1. The base of these tanks slopes towards the outlet to facilitate emptying of the contents during the measuring process.

(ii) Pump

A centrifugal type or a positive displacement pump (Item 3-Fig.1) of sufficient capacity may be used to draw the milk from the supply tank outlet, which may be located lower than the inlet of the pump; however, unless a priming pump is used, for the centrifugal type pump the level of milk in the supply tank is higher than the pump inlet.

A check valve at the inlet of the pump may be required to prevent draining of liquid. Flexible piping may be used with an appropriate adaptor/reducer to connect the pump to the outlet of the supply tank.

(iii) Priming Pump

The optional priming pump (Item 4-Fig.1) is a hydraulically-driven flexible impeller pump, or any other compatible priming pump that meets the minimum required flow rate, used to flood the centrifugal pump.

(iv) Check Valve

To prevent reverse flow, a spring-loaded non-return valve (Item 8-Fig.1) is located immediately downstream of the flowmeter, which opens at pressures above 20 kPa. Additional check valves upstream of the flowmeter may be required to prevent reverse flow. An optional product sampler and/or strainer may be fitted between the pump and the gas separator, or before the pump.

(v) Gas Elimination Device

The gas elimination device (Item 5-Fig.1) is a Smarta Industrial model AE100 (*) float-operated gas separator fitted between the pump and the meter. This device incorporates a round float that has a shaft through its centre which allows the float to move in a vertical plane. At the top of this shaft is a 'needle' that operates a seat assembly designed to seal off the vent located at the top of the gas separator.

As the liquid level in the gas separator rises, the float rises until the seat assembly seals off the vent and the flow is directed to the flowmeter. When the supply tank is emptied, pumping continues until the liquid level (and the float) in the gas eliminator drops, causing the 'needle' to lose contact with the vent seat, which allows the air to be vented to atmosphere and the flow to the meter stopped.

The point at which the 'needle' loses contact with the vent seat defines the 'liquid reference level' in the gas separator for the start and end of the delivery and is known as the Air Eliminator Quantity-measured in litres. The spring-loaded vent valve located at the top of the gas separator can be operated manually or pneumatically for facilitating the clean-in-place (CIP) operation.

(*) The submittor must be consulted regarding the acceptability of alternative gas elimination devices and approval provided before use with the MC104 device.

(vi) Temperature Sensor

A Smarta Industrial model TS100 temperature transmitter is used and is typically located on the downstream side of the pumps as shown in Figure 1-Item 7.

(vii) Measurement Transducer

The measurement transducer is a Proces-Data model PD340-C76 electromagnetic flowmeter (Figure 2) installed in a vertical position downstream of the gas separator. The flow through the flowmeter is in the upward direction.

The system has 3 × pipe diameters of straight pipe fitted upstream and downstream of the flowmeter.

(viii) Calculator/Indicator

The calculator/indicator is a Smarta Industrial model MC 104 (Figure 3) or any other Smarta Industrial supplied-NMI approved calculator/indicator compatible for use with an electromagnetic flowmeter and configured for displaying the volume in 1 L increments.

The calculator/indicator uses version 1.x.xxx software and has the following features:

- A LED display with touch screen, 4 buttons, RFID Reader, 2D Barcode reader with multiple digital and analogue inputs/outputs for readings and controlling flowmeter, temperature probe, switches and solenoids.
- Setup and Calibration settings for each device are accessed by scanning an approved User RFID tag or Barcode. Users with this access can only be approved by Smarta Industrial.
- Allows selection/input of driver, route, and supplier.
- Allows product collection and capture of the quantity and temperature.
- Empty the gas separator after last pickup.

- Initiate and record CIP (clean-in-place) operation.
- Transfer of data collected.

(ix) Flow Control

A flow control valve/device may be fitted downstream of the flowmeter.

(x) Power Supply

The power supply is provided by the vehicle to ensure the system operates on a voltage between 10 and 32 volts DC.

(xi) Printer

A Smarta Industrial model DRP100 printer or equivalent (*) can be connected to the calculator/indicator to provide printed dockets.

(*) "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 including all checking facilities and must be approved by Smarta Industrial prior to use with MC104 device.

1.3 Verification Provision

Provision is made for the application of a verification mark.

1.4 Sealing Provision

The MC104 device is sealed and provided with anti-tamper seal labels/covers. The Setup and Calibration settings of the device are only accessible with a Smarta Industrial approved RFID tag or Barcode. The approved RFID Tag or Barcode needs to be scanned by the device to allow access to the Settings menu.

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:

Pattern approval mark	NMI 5/6E/23
Manufacturer's identification mark or trade mark	…..
Meter model	…..
Serial number of the instrument	…..
Year of manufacture	…..
Maximum flow rate, Q_{max}	….. L/min
Minimum flow rate, Q_{min}	….. L/min
Minimum measured quantity (V_{min})	….. L
Priming quantity	….. L
Approved for use with milk	…..

(b) The minimum measured quantity must be displayed in the vicinity of the indication in the form of 'V_{min} (or 'MMQ' or 'Minimum Delivery') 100 L'.

2. Description of Variant 1 approved on 9/05/17

With alternative electromagnetic flowmeters as listed in Table 1. The calculator/indicator is configured to display the volume at least in 1 litre increments. Figure 2 shows a Proces-Data model PD340-C76 flowmeter.

TABLE 1

Meter Model	Maximum Flow Rate (L/min)	Minimum Flow Rate (L/min)	Minimum Quantity (L)
Proces-Data PD340-C25	116	16	5
Proces-Data PD340-C38	333	33	10
Proces-Data PD340-C51	666	66	50
Proces-Data PD340-C63	1333	83	50
Proces-Data **PD340-C76 (*)**	**2000**	**200**	**100**
Proces-Data PD340-C102	3332	300	100
Diessel IZM-E DN 50 G2	700	70	200
Diessel IZM-E DN 65G2	1000	100	500
Diessel IZM-E DN 80 G2	1500	150	500
Diessel IZM-E DN 100	4500	900	500
DiesselIZM-SEG2 DN 50	700	70	500
Diessel IZM-SEG2 DN 65	1000	100	500
Diessel IZM-SEG2 DN 80	1500	150	500
Diessel IZM-SEG2 DN 100	4500	900	500
DME MIF C63	1000	100	500
DME MIF C76	1500	150	500
DME MIF C63/PD340	1000	100	500
DME MIF C76/PD340	1500	150	500
GEA IZMAG DN 80	3000	60	200

(*) **The pattern**.

All systems have 3 × pipe diameters of straight pipe fitted upstream and downstream of the flowmeter.

TEST PROCEDURE

Instruments should be tested in accordance with any relevant tests specified in the Uniform Test Procedures. Instruments are to be tested with milk and the system either primed with milk before commencing the delivery, or the priming quantity marked on the data plate is added to the quantity measured.

NOTE: The quantity required to prime the system shall be determined at verification and shall be stamped on the nameplate. Complete one or more deliveries and check the volume indicated against the actual volume.

Maximum Permissible Errors at Verification

The maximum permissible errors are:

±0.5% for in service inspection (without introducing air/gas)
±0.3% for calibration adjustment of the meter.

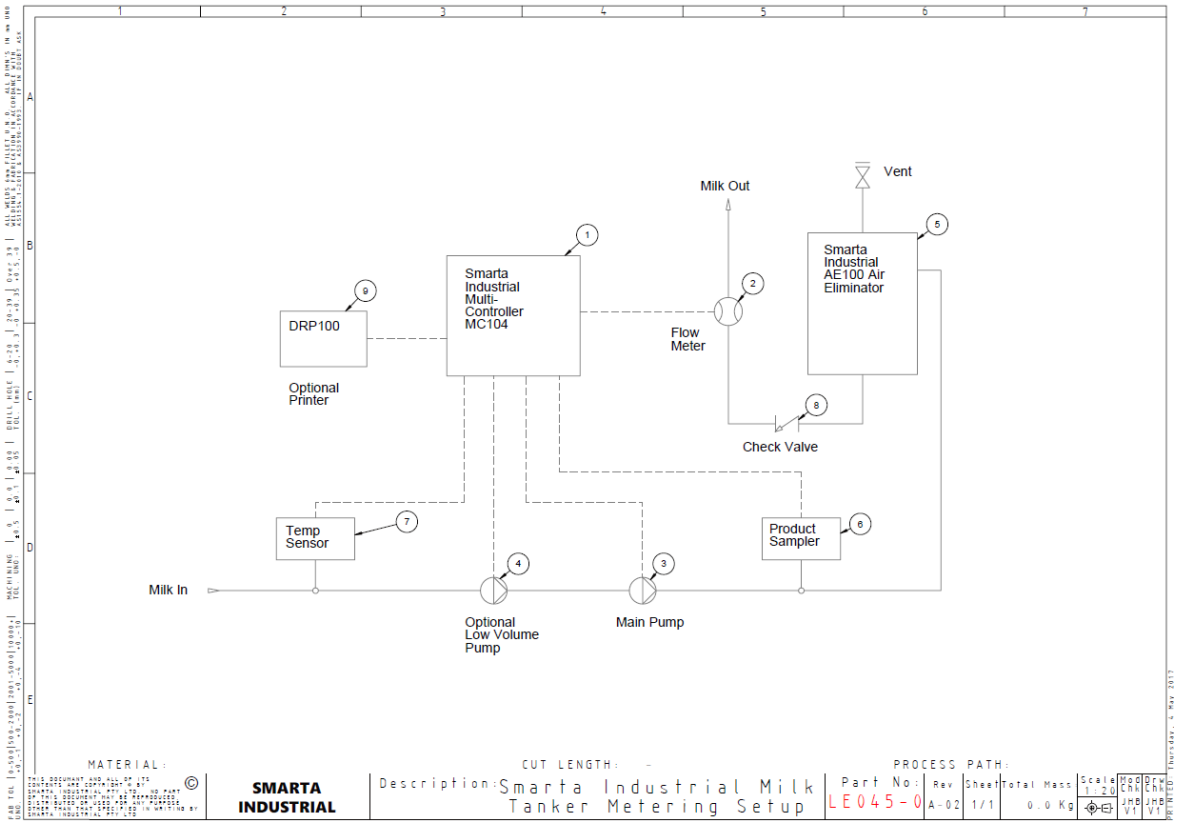
1. Empty Compartment Test

(a) Allow the supply to run dry during a test delivery; stop the pump motor and refill or change either the supply tank or the proving measure. Then start the pump motor to allow the delivery into the proving measure to continue; or

(b) Allow the proving measure to run dry during a test delivery.

NOTE: This test should only be carried out where it could be expected that the tank will be completely emptied during a normal day's operation. The maximum allowable difference between metering with no air/gas and introducing air/gas is 1%.

FIGURE 5/6E/23 – 1



Smarta Industrial Model MC104 Milk Flowmetering System (Pattern)

FIGURE 5/6E/23 – 2

A Proces-Data Model PD340-C76 Electromagnetic Flowmeter

FIGURE 5/6E/23 – 3

Smarta Industrial model MC 104 calculator/indicator

~ End of Document ~