



Australian Government
**Department of Industry, Science,
Energy and Resources**

National Measurement Institute

36 Bradfield Road, West Lindfield NSW 2070

Certificate of Approval NMI 5/6E/17

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.

Bartec MAK Tiger Model 3003 Milk Flowmetering System

submitted by Bartec Benke GmbH
 Schulstrasse 30
 94239 Gotteszell, Bavaria
 Germany

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 July 2011.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern provisionally approved – interim certificate issued	16/08/13
1	Pattern amended (validity) – interim certificate issued	26/02/15
2	Pattern approved – certificate issued	4/09/15
3	Amend sealing provision – certificate issued	11/01/21

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 5/6E/17' and only by persons authorised by the submitter.

Instruments purporting to comply with this approval and currently marked 'NMI P5/6E/17' may be re-marked 'NMI 5/6E/17' 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.

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
Policy and Regulatory Services

TECHNICAL SCHEDULE No 5/6E/17

1. Description of Pattern **provisionally approved on 16/08/13**
approved on 4/09/15

The Bartec MAK Tiger model 3003 vehicle-mounted milk flowmetering system using a Bartec model 6823-x electromagnetic flowmeter (also known as a PROCES-DATA model PD340C76 (3")) 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 flow meter 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)

The measuring system basically consists of

- an electronic calculator/indicator with a measured value memory and additional devices
- a magneto-inductive flowmeter (MID)
- an appliance that prevents deviations caused by amounts of air

(a) Start of pick-up, measuring system filled

The milk is suctioned from the intake tank (farm tank) into the pick-up system. As soon as there is a response of the level sensor the pump is started.

Now the pump generates an under-pressure and suctions milk from the intake tank. The milk is pumped through the magneto-inductive flowmeter (MID), the pressure-side bubble sensor (U_IN2) and the non-return valve (NRV) in the tank.

The pump control is self-adaptive and adjusts itself to the intake situations. A vacuum configured in the compact controller is regulated via the PWM control of the pump.

The vacuum-side bubble sensor (U_IN1) constantly checks if there are any air inclusions. If any air inclusions are detected, the pump performance is reduced accordingly.

With the pressure-side bubble sensor (U_IN2), air/gas inclusions are measured and set off against the measured volume.

(b) End of intake

If the level sensor detects a low level, the pump is stopped.

The remaining milk is suctioned into the pick-up system by the vacuum existing in the vacuum buffer.

Now the rest of the milk is pumped in the tank until the level of the level sensor is reached.

The transfer point in the level sensor can vary and is set off against the start value in the controller.

(c) Measured pumping-over operation

Instead of via the suction hose, the milk is suctioned into the measuring system via the pumping over connection. This procedure is identical to the milk intake described above. The pump is stopped if the level sensor detects a low level.

(d) Dry start priming volume

The priming volume is the pipe pump volume between the level sensor and the pressure-side Bubble sensor; both the level sensor and the bubble sensor are self-degassing, i.e. they are mounted vertically or inclined upwards. The volume is measured by three dry starts.

(e) A supply tank.

The supply tank is a milk tank or a vat to which the metering system is temporarily connected. The base of these tanks slopes towards the outlet to facilitate emptying of the contents during the measuring process.

(f) Pump

A centrifugal type pump or a positive displacement pump 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.

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.

(g) Air Elimination Device

A Bartec model 6900-1x bubble air sensor is used to determine when the pipe is full before commencing pumping, control the pump speed and determine the end of collection and ramping the speed down to allow a controlled laminar flow of the milk at the rate it is running from the vat. This along with a calculated maximum pipe efficiency to work out maximum pump effort eliminates or minimises air from passing through the flowmeter. Include air eliminators

The spring-loaded vent valve located at the top of the air eliminator can be operated manually or pneumatically for facilitating the clean-in-place (CIP) operation.

A drain valve is allowed to be installed in the pipe exiting from the air eliminator (Figure 1b) so that during the calibration of the system, the air eliminator and pipework can be completely evacuated. This valve must be sealed after calibration is completed.

(h) Measurement Transducer

The measurement transducer is a Bartec model 6823-x electromagnetic flowmeter (also known as a PROCES-DATA model (also known as a PROCES-DATA model PD340C76 (3")) (Figure 2) installed in a vertical position.

(i) Check Valves

To prevent reverse flow, a spring-loaded non-return valve, which can be located immediately downstream or upstream of the flowmeter, opens at pressures above 20 kPa. An optional product sampler and/or strainer may be fitted before the pump.

(j) Flow Control

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

(k) Transfer Point

The transfer point is defined by the level sensor.

(l) Calculator/Indicator

A TCS model BARTEC type 6942-1x electronic calculator/indicator (Figure 3) is used with the electromagnetic flowmeter and configured for displaying the volume in 1 L increments.

The signal from the measuring transducer is transferred to the calculator/indicator via a P-Net fieldbus. The calculator/indicator features an 'empty pipe detection' facility accessible via the pumping screen which allows suppression of measurement while the pipe is empty.

The BARTEC calculator/indicator (software version 1.x) has the following features:

- An LCD touch screen.
- Input/output (digital or analog) - Connection of magnetic valves or evaluation of feedback
- BARTEC P-Net - Connection to P-Net bus (electromagnetic flowmeter)
- BARTEC USB - Connection of optional components not relevant for the measurement
- RS232 - Connection of a printer or of components not relevant for the measurement
- RS485 - Connection of components not relevant for the measurement
- HART - Connection of components not relevant for the measurement
- BARTEC-Ethernet - Connection of components not relevant for the measurement
- Pt100 (4-conductor) - Connection of optional temperature sensors
- Bluetooth - Connection of components not relevant for the measurement
- Count - Rotation speed input (rev)
- PWM - Pump control
- A docket printer
- A function, open, start, stop and quit soft buttons
- A RFID writer
- Eight digital inputs and outputs (controlling pumps, valves and samplers) and one analogue input for temperature measurement
- Incorporates programmable levels of security. Access to meter calibration is only possible via a mechanical calibration/verification switch. The switch can be secured by means of a destructible adhesive label over the switch.

A typical sequence of operation is:

- Input driver number, route number and supplier number;
- Measure the quantity collected;
- Repeat above for each load;
- Discharge the milk collected and initiate data transfer sequence; and
- Initiate CIP (clean-in-place) operation.

Or any other NMI approved calculator indicator.

(m) Power Supply

The power supply is provided by the vehicle to ensure the system operates on a voltage between 9 and 36 volts DC.

1.3 Verification Provision

Provision is made for the application of a verification mark.

1.4 Sealing Provision

The 'cal/measure' switch for the flow sensor electronics module and terminal box can be secured by a sealing wire through the holes in the two sealing screws provided (Figure 2), or alternatively by means of a lead seal or similar. A destructible adhesive label is placed over the verification switch in the BARTEC type 6942-1x calculator/indicator (Figure 4). Note that the 'program enable' switch in the terminal box of the flow sensor can be set to the 'on' position (meter calibration is secured by the verification switch in the calculator/indicator).

1.5 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
Pattern approval number for the instrument
Meter model	
Serial number of the instrument
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

TEST PROCEDURE No 5/6E/17

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.

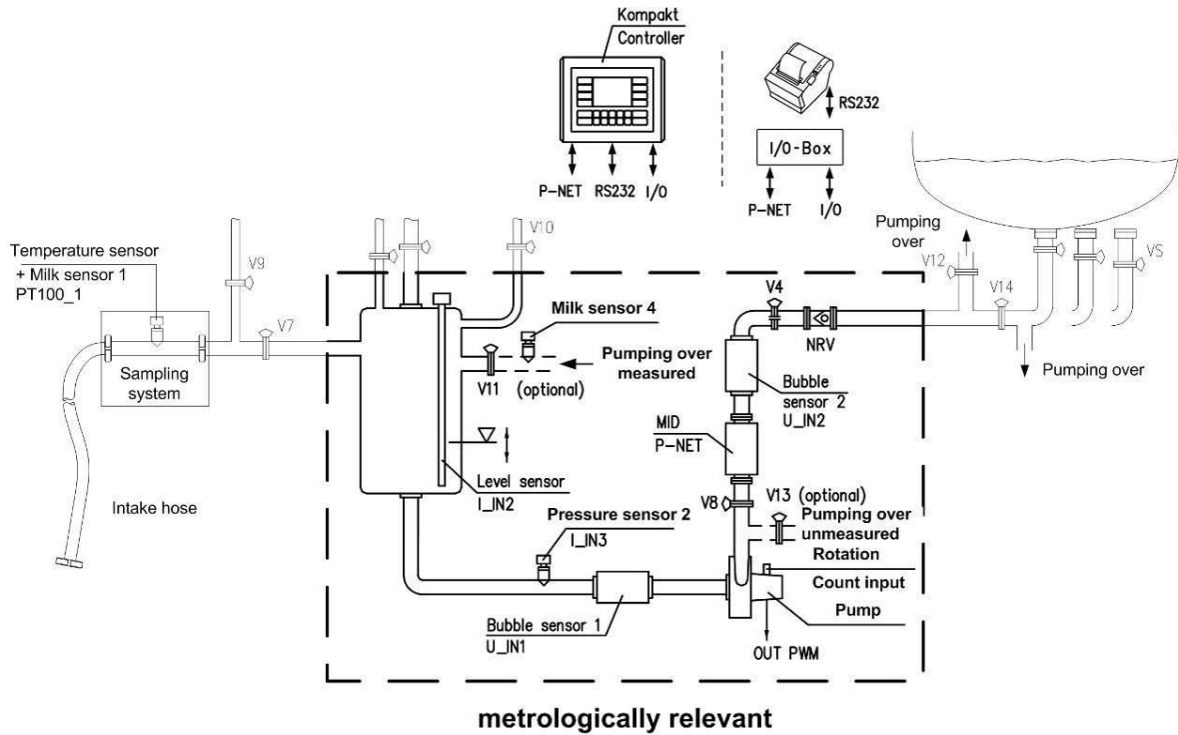
Instruments are to be tested with milk. The priming quantity is stored by the system (secured by the verification switch in the calculator/indicator) and is automatically added to the quantity measured if the system is not primed.

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

Maximum Permissible Errors

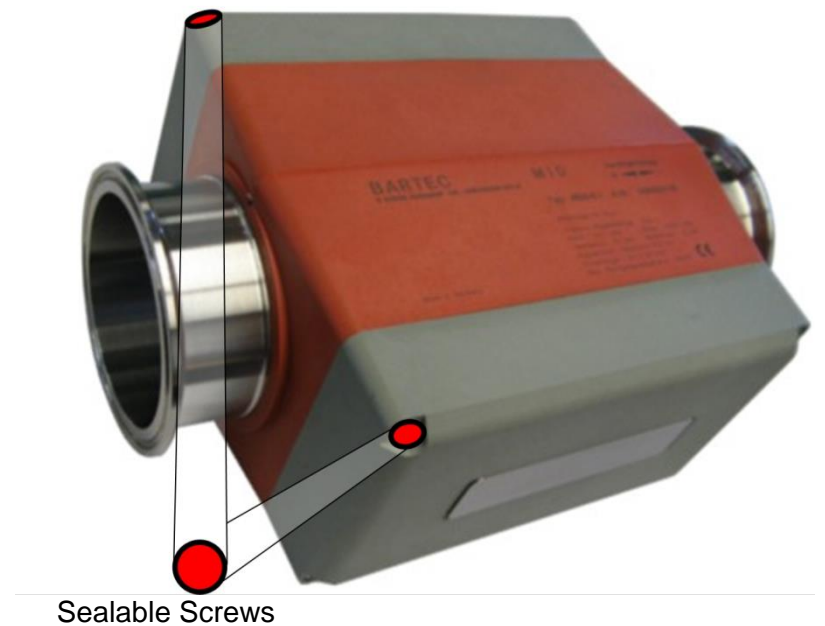
The maximum permissible errors are specified in Schedule 1 of the *National Trade Measurement Regulations 2009*.

FIGURE 5/6E/17 – 1



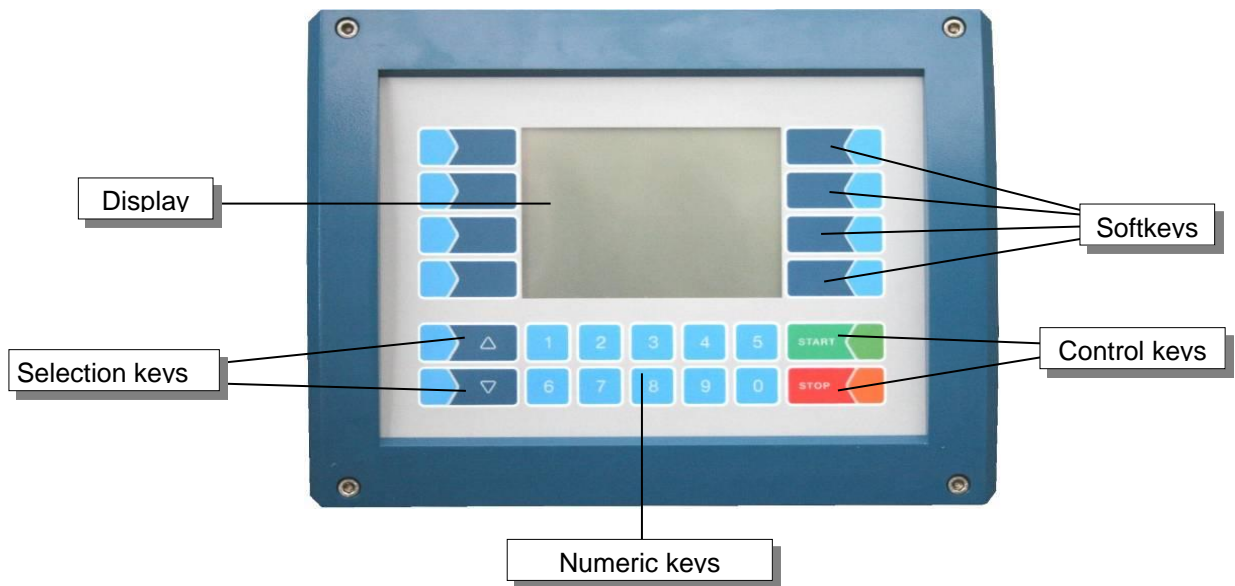
Bartec MAK Tiger Model 3003 Milk Flowmetering System

FIGURE 5/6E/17 – 2



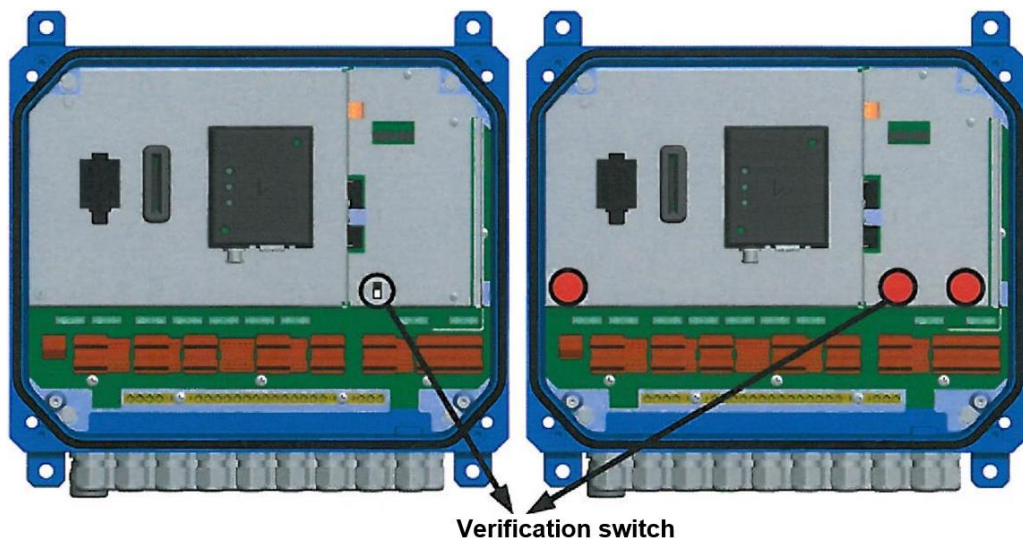
Bartec Model 6823-x Electromagnetic Flowmeter
((also known as a PROCES-DATA model PD340C76 (3")))



FIGURE 5/6E/17 – 3



TCS Model BARTEC Type 6942-1x Calculator/Indicator

FIGURE 5/6E/17– 4



Calculator/Indicator seal positions		
Verification switch		
open Access possible to metrological relevant parameters		closed Access <u>not</u> possible to metrological relevant parameters
		Sealed  with marks - Calibrations-switch - Covering

~ End of Document ~