



Australian Government

**National Measurement
Institute**

Bradfield Road, West Lindfield NSW 2070

Supplementary Certificate of Approval

No S528

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

Flow Instruments Model Flowcom 2000 Calculator/Indicator for Liquid-measuring Systems

submitted by Flow Instruments
 Heiligenstock 34 c-f
 42697 Solingen
 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 documents NMI R 117-1, *Measuring Systems for Liquids Other than Water*, dated July 2004 and NMI R 81 *Dynamic Measuring Devices and Systems for Cryogenic Liquids* dated August 2009.

CONDITIONS OF APPROVAL

This approval becomes subject to review on 1 February 2014, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked with approval number 'NMI S528' and only by persons authorised by the submitter.

Instruments incorporating a component purporting to comply with this approval shall be marked 'NMI S528' in addition to the approval number of the instrument.

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.

The National Measurement Institute 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 25 January 2010

- A Flow Instruments model Flowcom 2000 calculator/indicator for use in liquid-measuring systems incorporating a compatible NMI-approved flowmeter. The pattern may also be known as a model FC2000.

Technical Schedule No S528 describes the pattern.

FILING ADVICE

The documentation for this approval comprises:

Supplementary Certificate of Approval No S528 dated 25 March 2010
Technical Schedule No S528 dated 25 March 2010 (incl. Test Procedure)
Figures 1 to 5 dated 25 March 2010

Signed by a person authorised by the Chief Metrologist to exercise his powers under Regulation 60 of the *National Measurement Regulations 1999*.

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke at the bottom.

TECHNICAL SCHEDULE No S528

Pattern: Flow Instruments Model Flowcom 2000 Calculator/Indicator for Liquid-measuring Systems

Submittor: Flow Instruments
Heiligenstock 34 c-f
42697 Solingen Germany

1. Description of Pattern

A Flow Instruments model Flowcom 2000 calculator/indicator (Figure 1) for use in liquid-measuring systems incorporating a compatible (#) NMI-approved flowmeter. The pattern may also be known as a model FC2000.

(#) "Compatible" is defined to mean that no additions/changes to hardware/software are required for satisfactory operation of the complete system including all checking facilities.

1.1 Field of Operation

The field of operation of the pattern is determined by the following characteristics:

- Input voltage ranges:
 - for the calculator/indicator 9 V DC to 35 V DC
 - for the printer 24 V DC (*)
- Liquid temperature range -200°C to 85°C
- Pressure range 200 kPa to 7000 kPa
- Environment temperature range -25°C to 55°C
- Accuracy class Class 1.0, 1.5 or 2.5, depending on the product

(*) Generated from a 9-35 V DC power supply by a dedicated DC/DC converter located inside the printer enclosure.)

1.2 Calculator/Indicator

The model Flowcom 2000 calculator/indicator (Figure 1) has a dot-matrix alphanumeric liquid crystal display with LED backlight. The instrument has four blue-coloured function buttons (which may be labelled Delivery, Service, Contrast, Fill VT, etc.) and a red-coloured ON/OFF button.

The calculator/indicator operates with Flow Instruments version 2.xx software; the version number is displayed during the power-up sequence.

The calculator/indicator set-up functions are accessible by a sealable switch and/or by entering a password allowing access to the following functions:

- Password: Password
- Product: Product to be dispensed
- Main setup: List of calibration-relevant parameters
- User setup: List of non-calibration-relevant parameters
- PumpSmart: Pump cooling down control functions
- Multipoint: Linearisation table
- Polynomial: Density polynomial readout
- Dyn mode: Manual calibration mode

- Totaliser: Totaliser
- Date/Time: Enter current date and time
- Sensor: Test and calibration functions for external sensors
- A/D internal: Display internal analogue values
- I/O Test: Test functions for the digital ports
- Report: Report on daily transactions
- Hour meter: Hour meter
- Keyboard: Keyboard test
- Switch UFS: Turning off overfill protection
- Printer test: Test the system printer
- Com Test: Test the serial interface

1.3 Power Supply

The instrument operates with a 9 to 35 V DC power supply. The built-in time clock and memory use a lithium battery to maintain time, date and calculated totals.

1.4 Checking Facilities

The calculator/indicator has the following checking facilities:

- A sensor, setup and backup battery check is performed at power up; a failure is shown on the display. On fatal errors, measuring/counting is not possible. No delivery button is shown. Also, the graphical display can be controlled by optical check during power up.
- Temperature probe checking with faults detected and displayed as either 'High Temp' or 'Low Temp' message.
- 'High Rate' or 'Low Rate' message if the flow rate is out of approved range.
- A check of the presence and of the correct signal output from the measurement transducer.
- Outputs are provided to control the delivery process and if necessary prevent measurements when errors are detected. This requires an additional card for binary outputs and automatic valves.
- When configured for use with a printer, the Flowcom 2000 checks for the presence of paper and correct operation of the printer by displaying 'Printer Error' when faults are detected.

1.5 Measurement (Differential Pressure) Transducer

A Rosemount model 1151 Smart (Figure 2a) or model 3051 Smart (Figure 2b) differential pressure transducer is used to measure the differential pressure at the restriction in the metering section of an NMI-approved flowmeter. The differential pressure data is sent to the Flowcom 2000 calculator/indicator as a 4 to 20 mA signal. The level of maximum pressure differential depends on factors including the maximum flow rate, flowmeter diameter and pump pressure.

1.6 Temperature Transducer

The temperature transducer (Figures 3a and 3b) is a PT100-Thermometer (100 ohms @0°C, -200°C to +85°C) connected as 4-wire. Alternatively, a temperature transducer with a 4 to 20 mA output may be used. The temperature transducer is normally fitted upstream of the flowmeter.

1.7 Pressure Transducer

Flowmetering systems delivering carbon dioxide (CO₂) may be fitted with an Endress & Hauser model PMC131 pressure transmitter to calculate the amount of vapour return gas. The maximum operating pressure is 2.5 MPa. The pressure transducer is connected to a 3/2 way valve to monitor the pressure of the supply tank and the customer's receiving tank.

1.8 Printer

For applications where the delivery is carried out without the presence of the customer, an approved printer such as Epson model TM-295 (Figure 4) or equivalent (*) is interfaced to the calculator/indicator. If a ticket needs to be re-printed, the words "Duplicate ticket" will be printed at the top.

- (*) "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.

1.9 Verification Provision

Provision is made for the application of a verification mark.

1.10 Sealing Provision

Provision is made for access to the calibration adjustments to be restricted by sealing the calibration switches as shown in Figure 5.

1.11 Markings

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

Manufacturer's name or mark	Flow Instruments & Engineering GmbH
Model number
Serial number
Pattern approval mark	NMI No S528
Year of manufacture
Accuracy class (#)
Environmental class	I

- (#) Class 1.0, 1.5 or 2.5, depending on the product.

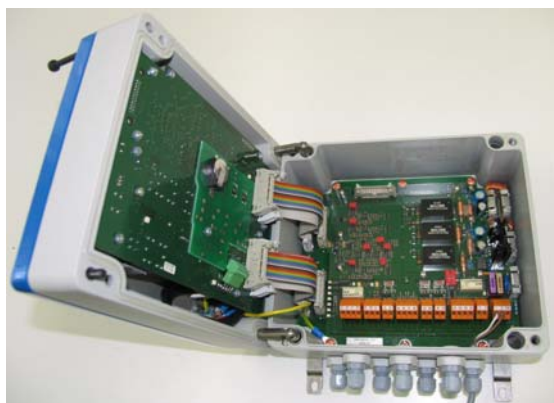
The minimum measured quantity is marked or displayed on the face of the indicator in the form "Minimum Delivery 100 L, kg or m³".

TEST PROCEDURE

Instruments shall be tested in conjunction with any tests specified in the approval documentation for the instruments to which the pattern is connected, as appropriate, and in accordance with any relevant tests specified in the Uniform Test Procedures (National Instrument Test Procedures).

The maximum permissible errors applicable are those applicable to the liquid-measuring system to which the instrument approved herein is fitted.

FIGURE S528 – 1



Without Binary I/O Board



With Binary I/O Board

Flow Instruments Model Flowcom 2000 Calculator/Indicator

FIGURE S528 – 2



(a) Rosemount Model 1151 Smart Differential Pressure Transducer



(b) Rosemount Model 3051 Smart Differential Pressure Transducer

FIGURE S528 – 3



(a) A Typical PT100-Thermometer Without Pre-connected Cable



(b) A Typical PT100-Thermometer With Pre-connected Cable

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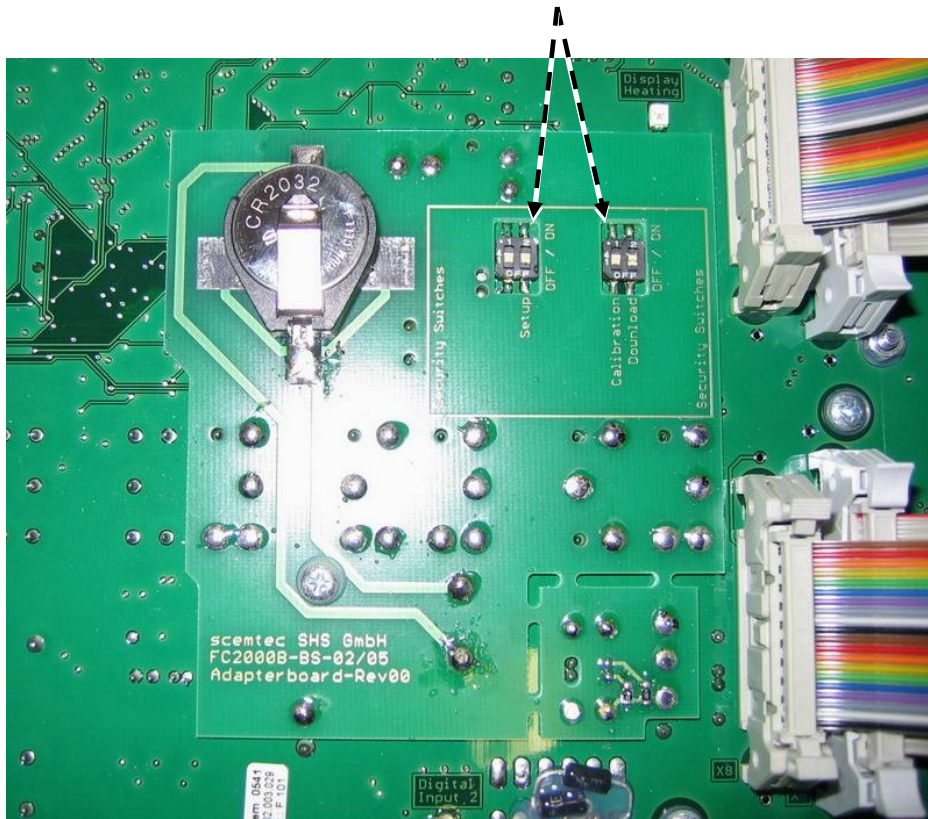
FIGURE S528 – 4



Epson Model TM-295 Printer

FIGURE S528 – 5

Switches to be sealed



Destructible sealing labels in place



Typical Sealing of Calibration Switches