Australian Government

**Department of Industry,
Science and Resources**

**National
Measurement
Institute**

36 Bradfield Road, West Lindfield NSW 2070

Supplementary Certificate of Approval
NMI S496

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.

TechnipFMC Model microLoad.net ML-XP-STD-2 Control System for Liquid-measuring Systems

submitted by   Smith Meter Inc.
                            1602 Wagner Avenue
                            Pennsylvania 16510
                            United States of America

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 117-1, *Measuring Systems for Liquids Other than Water*, dated June 2011.

This approval is subject to review at the decision of the Chief Metrologist in accordance with the conditions specified in the document NMI P 106.

DOCUMENT HISTORY

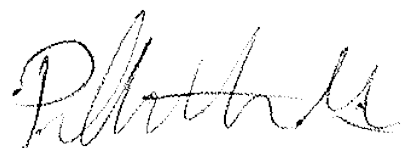| Rev	Reason/Details	Date
0	Pattern approved – interim certificate issued	30/05/07
1	Pattern approved – certificate issued	11/09/07
2	Pattern reviewed & updated – certificate issued	30/11/12
3	Pattern amended (submitted by) – certificate issued	07/07/20
4	Pattern amended (submitted by) – certificate issued	23/07/25

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI S496' and only by persons authorised by the submittor.

Instruments incorporating a component purporting to comply with this approval shall be marked 'NMI S496' in addition to the approval number of the instrument, 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 Certificates No S1/0/A or 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.*

Phillip Mitchell
A/g Manager
Policy and Regulatory Services

TECHNICAL SCHEDULE NMI S496

1.   Description of Pattern   approved on 30/05/07

A Smith Meter® model microLoad.net ML-XP-STD-2 single arm single product flowmetering controller/indicator (Figure 1) for use with compatible (#) approved liquid-measuring systems.

(#)   'Compatible' is defined to mean that no additions/changes to the hardware/software specified in this approval are required for satisfactory operation of the complete system.

1.1   Field of Operation

The field of operation is determined by the following characteristics:

• Power supply	240 V AC mains supply
• Maximum input frequency	10 000 pulses/second/channel
• Frequency range	0 to 3000 Hz
• Liquid temperature range	−10 °C to +50 °C
• Environment temperature range	−25 °C to +55 °C (i.e. Class C)
• Non-linearity correction facility	4 points
• Density range for volume conversion to 15 °C for generalised products and crude oils	0.610 to 1.076 kg/L
• Accuracy class	Class 0.5

1.2   Controller/Indicator Design/Features

The model ML-XP-STD-2 controller/indicator (Figure 1) incorporates an alphanumeric graphic liquid crystal display (LCD) for displaying messages/prompts.

The volume display can be programmed for 0.01 L, 0.1 L or 1 L increments and can display up to 7 digits.

The data entry/selection is made via a keypad having eleven numeric and six function keys.

The model ML-XP-STD-2 controller/indicator uses version microLoad Rev 00.xx CRC C587E3E5 software, which can be viewed when all deliveries are completed by selecting Diagnostics Menu from the Main Menu and pressing the 'Enter' key; then scroll and select Software Version, then press the 'Enter' key.

The model microLoad.net ML-XP-STD-2 controller/indicator has features including:

•   Linearity correction;
•   Batch pre-set; and
•   Volume conversion for temperature facility.

The controller/indicator has the following input/outputs:

- An Ethernet port for a supervisory computer.
- Three EIA232/485 interfaces for printers, card readers, etc.
- Two pulse inputs for pulse generators.
- An RTD input for a temperature probe.
- A 4-20 mA input for a pressure transmitter.
- Three DC digital inputs for security switch, flow switch, etc.
- Two DC digital outputs for alarm relays, pumps, etc.
- Four AC digital outputs for pumps, injectors, stop relays, etc.
- A pulse output for and external totaliser.

1.3 Non-Linearity Correction Facility

When the non-linearity correction facility is enabled, up to four k-factors can be entered as a function of frequency (flow rate) within the approved range. The controller/indicator applies interpolation processes to calculate the meter factor for the current flow rate based on the meter factor programmed for the next highest and the next lowest flow rates.

1.4 Volume Conversion for Temperature Facility

An electronic volume conversion for temperature facility is used to convert the measured volume to volume at 15 °C. The conversion is based on the following ASTMIP- API Petroleum Measurement Tables, metric editions:

- Table 54A for Crude Oils;
- Table 54B for Generalised Petroleum Products;
- Table 54C for Pure Biodiesel (to Australian government standard); or
- Table 54D for Lube Oils.

1.5 Temperature Transmitter

For temperature measurement applications, a Fisher-Rosemount model 0065, PT 100 4-wire 100 ohm RTD transmitter, or any other equivalent (*) temperature probe with similar characteristics, is used.

(*) '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 complete system.

1.6 Pulse Generator

The controller/indicator is approved for use with a Smith Meter® model UPT XU-1000-STD-00 pulse generator as described in the documentation of approval NMI S465 or any other compatible (#) approved measurement transducer.

1.7 Flow Control Valve

Any compatible (#) solenoid-operated flow control valve, located downstream of the flowmeter, may be interfaced to the instrument for controlling the delivery process and to stop measurements in the event of errors detected by the checking facility.

(#) 'Compatible' is defined to mean that no additions/changes to the hardware/software specified in this approval are required for satisfactory operation of the complete system.

1.8 Printer

An OKI model Microline or any other equivalent (*) printer.

(*)   '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 complete system.

1.9 Operational Procedures

The model microLoad.net ML-XP-STD-2 controller/indicator is predominately designed to automatically control the delivery of a flowmetering system based on the entered pre-set volume and the pre-programmed flow profile.

The following is a typical operating sequence, however each site may require a different operating procedure – refer to the operating manual.

- Press the 'Set' button (initiates a pixel check on the indicator).
- Enter the pre-set quantity.
- Press 'Start' or 'Stop' button.

Various metering data may be displayed, including:

- Indicated volume ('IV').
- Gross volume ('GV').
- Gross standard temperature ('GST').
- Gross standard volume ('GSV').
- Temperature.
- Pressure.
- Set density.

1.10 Checking Facilities

- An automatic pixel segment test for the volume display is performed at the start of each delivery or subsequently by pressing the 'Set' button.
- The dual output signal from the measurement transducer is monitored.
- If density or temperature is outside pre-determined range alarms will be displayed on the indicator.
- Outputs are provided to control solenoid-operated valves to control the delivery process and prevent measurements when errors are detected.
- The indication is retained on power failure. The totaliser value is stored in the non-volatile memory. When power is restored, the printer (if connected) will automatically print the last delivered volume.

1.11 Sealing Provision

Provision is made for access to the calibration adjustments to be sealed by means of a lead and wire seal and the sealing screws at the side of the MicroLoad.net unit. Note that calibration parameters can also be changed electronically via password-protected access; a data log of the changes is provided.

1.12 Verification Provision

Provision is made for the application of a verification mark.

1.13   Markings and Notices

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

Pattern approval sign		NMI S496
Manufacturer's name or mark		FMC Technologies Measurement Solutions Inc
Manufacturer's designation (model)		…..
Serial number		…..
Year of manufacture		…..
Environmental class		class C
Density range	(*)	….. kg/m³ to ….. kg/m³
Liquid temperature range	(*)	−10 °C to +50 °C

(*)   Required when volume conversion for temperature is activated.

When the volume conversion facility is activated, the indicator reading face shall display 'Litres at 15 °C' or 'Volume at 15 °C'.

The minimum measured quantity specified for the meter shall be programmed into the MicroLoad.net controller/indicator in the form of pre-set quantity to prevent deliveries less than the specified minimum delivery for the flowmeter to which the controller/indicator is interfaced.

TEST PROCEDURE No S496

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 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.

Maximum Permissible Errors

The maximum permissible errors applicable are those specified below and those specified for the flowmetering system in which the pattern is fitted, as stated in the approval documentation for the system.

For checking the linearity correction facility, refer to the operating manual.

Check that the minimum measured quantity specified for the flowmeter is programmed into the loading controller/indicator to prevent deliveries less than the specified minimum delivery for the flowmeter to which the controller/indicator is interfaced.

Recommended Procedure For Systems With Volume Conversion For Temperature Facility Enabled

1. Verify the accuracy of the flowmeter using the displayed metered volume at operating conditions (unconverted volume).

2. For each delivery, record the volume at 15 °C, the set density and the average temperature displayed by the instrument. Verify that the density setting is within ±1 kg/m³, and that temperature measurement is within ±0.5 °C

3. For the temperature and density displayed by the instrument, use the appropriate petroleum tables to determine the volume conversion factor and calculate the volume at 15 °C. The maximum permissible error between the calculated volume at 15 °C and the volume at 15 °C displayed by the instrument is 0.05%.

Notes:

(i) Refer to the operating manual to obtain the required readings of volume at 15 °C.

(ii) When verifying the accuracy of the flowmeter, it is recommended that this be done with a single k-factor and the linearity correction facility disabled. Once the linearity of the flowmeter has been established, the appropriate meter factors as a function of flow rate can be calculated and entered into the instrument. A final calibration check shall be carried out to check for correct implementation of the linearisation factors entered.

NOTE: NMI reserves the right to vary this procedure. Any such variation shall be notified in writing by NMI.

FIGURE S496 – 1

Smith Meter® Model microLoad.net ML-XP-STD-2 Controller/Indicator

~ End of Document ~