



Australian Government
Department of Industry,
Innovation and Science

**National
Measurement
Institute**

36 Bradfield Road, West Lindfield NSW 2070

Supplementary Certificate of Approval
NMI S769

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.

Veeder Root Model EMR4 Calculator/Indicator for Liquid-measuring Systems
submitted by Gilbarco Australia Pty Ltd
 20 Highgate Street
 Auburn NSW 2114

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 July 2011.

This approval becomes subject to review on 1/10/23, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern Approved – Certificate issued	20/11/2018

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI S769' and only by persons authorised by the submitter.

Instruments incorporating a component purporting to comply with this approval shall be marked 'NMI S769' in addition to the approval number of the instrument, and 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 of Approval 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
Pattern Approval, Policy and
Licensing Section

TECHNICAL SCHEDULE No S769

1. Description of Pattern

approved on 20/11/2018

The pattern is a Veeder Root model EMR4 Display Head (Figure 1), EMR4 Interconnect Box (Figure 2), with a Veeder Root model 8452 remote pulse transmitter (Figure 3) or any NMI-approved measurement transducer generating compatible (#) pulse output proportional to volume throughput, for use in liquid-measuring systems incorporating compatible (#) NMI-approved vehicle-mounted flowmeters. Alternatively, the model EMR4 unit may be fitted internally with a compatible Bourns model ENS1J-489-L00100 internal pulse transmitter.

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

1.1 Field of Operation

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

- Input pulse rate

	1667Hz Maximum
	1.667Hz Minimum
- Input voltage ranges:

for the calculator/indicator	10 VDC to 28 VDC
for the pulse generator	5 VDC
for the printer	24 V DC \pm 7%
- Liquid temperature range

	-10°C to 50°C
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- Environment temperature ranges:

for the Display head	-40°C to 70°C
for Interconnect Box	-25°C to 55°C
for printers TM-U220	5°C to 40°C
TM-U295	0°C to 50°C
- Non-linearity correction facility
- Density range for volume conversion to 15°C:

for generalised products	0.600 kg/L to 1.200 kg/L
for LPG	0.450 kg/L to 0.650 kg/L
- Accuracy class

	0.5
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1.2 Features

The model EMR4 calculator/indicator (Figure 1) includes an alphanumeric liquid crystal display and may also have a keypad attached. The model EMR4 unit may receive measurement pulses from the measurement transducer or it may be fitted with an internal pulse transmitter unit mechanically linked to the flowmeter.

The model EMR4 Interconnect Box uses version 349869-001 software. The Display Head uses version 349870-001 software and includes an alphanumeric liquid crystal display with the following maximum volume display:

99 999.9 L when the resolution is set to 0.1

999 999 L when the resolution is set to 1

When the resolution is set to 0.1, and the volume exceeds 99 999.9 L, the resolution is reduced to 1, and dispensing is allowed to continue with reduced resolution display.

When the resolution is set to 1, and the volume exceeds 999 999 L, the resolution is reduced to 100L steps, and the volume is displayed suffixed with "H". For example, when adding 1L to 999 999L, the next display value will be 10 000H (10,000 hectolitres, or 1 000 000 litres). If the volume to display exceeds 99 999H (9 999 999), the displayed volume wraps to 0H. Note that the volume is tracked correctly internally up to 99 999 999 litres.

The accumulated total is displayed up to 99 999 999 L before rolling over to 0. The accumulated total can be reset to zero via the calibration mode.

The instrument is configured via the front panel navigation buttons. The instrument can display and record the temperature of the liquid and the volume at 15°C.

1.3 Calibration

The Veeder Root model 8455 EMR4 calculator/indicator is configured either for a single k-factor or up to eight k-factors to define the relationship between the volume throughput and the pulses generated by the measurement transducer.

There is one range for each k-factor: 0.01 to 999.999 pulses/litre

In a manual calibration, to adjust the volume delivered by the measurement transducer, change the current k-factor using the following formula:

$$\text{New k-factor} = (1 + \% \text{ Error} / 100) \times \text{current k-factor}$$

In an automatic calibration, use the EMR4 START and FINISH buttons to dispense a known amount of liquid into a prover vessel.

Note: In the calibration mode, an EMR4 can be set to limit the variation between any two k-factors to $\pm 0.25\%$

The Veeder-Root EMR4 model 8457 Interconnect Box (Figure 2) provides intrinsically safe power and contains the main operational software. It also provides the control interface between the calculator/indicator and the rest of the measuring system.

1.4 Pulse Generator

The Veeder Root model 8452 pulse transmitter (Figure 3) comprises a 100-slot disk with two optic sensors to provide a two-channel pulse output. The calculator uses a combination of high/low states from each channel to obtain a total count of 100 pulses per shaft revolution of the pulse generator. The maximum shaft speed for the pulse generator is 1000 revolutions per minute at which the calculator produces 1666.7 counts per second.

1.5 Printer

An Epson model TM-U295 dot matrix slip printer (Figure 4) or an Epson model TM-U220A printer (Figure 5), or any other equivalent (*) printer is used for printing delivery dockets showing the date and time of the delivery, docket number, quantity delivered, price and other operator entered details.

- (*) '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.

1.6 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 hardware/software are required for satisfactory operation of the complete system.
- (*) '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.

1.7 Checking Facilities

The instrument incorporates the following checking facilities:

- A segment check is performed on the display at power and up prior to each delivery.
- 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.
- When configured for use with a printer, the EMR4 checks for the presence and correct operation of the printer.

1.8 Volume Conversion for Temperature Facility

An electronic volume conversion for temperature facility is used to convert the measured volume to volume at 15°C. Activation of the volume conversion feature is indicated by the thermometer symbol on the right side of the display and is activated via the calibration mode for the approved products. The conversion is based on ASTMIP-API Petroleum Measurement Table 54 for LPG or Table 54B for Generalised Petroleum Products.

The density is fixed via the calibration mode. In such applications, temperature measurement is required and can be displayed by the EMR4.

For temperature measurement, a Veeder Root part number 845900-x02 two conductor, thermistor type probe with a resistance of 10,000 ohms @ 25°C is used or any other compatible (#) temperature probe with similar characteristics.

If the product density of the measured volume, expressed in units of kg/m³, is entered into the calculator/indicator at the beginning of the measurement operation, then a printer is mandatory for printing the delivery details and the density for which the volume conversion is set.

Notes:

1. The above printers must be situated in a location that will satisfy the temperature requirements of 5°C to 40°C or 0°C to 50°C respectively.
2. Where the vehicle battery supply is 12 V, a voltage doubler is **not** required.

1.9 Sealing Provision

The Meter Mounted Display Head, Remote Display Head, Interconnect Box and the remote pulse transmitter all have provision for mechanical sealing (Figures 5 to 9).

Access to the calibration parameters is via the Calibration & Configuration switch located inside the display head enclosure.

The Meter Mounted Display Head top cover is bolted to the display head housing and two of the bolts are drilled to permit the use of a wire security seal to restrict access to the C&C switch.

The Remote Display Head is supplied with a C&C switch mounted on the front cover. A cap with a drilled hole is installed over the C&C switch and permits use of a wire security seal to restrict access to the C&C switch.

For meter calibration, the sealing wire must be broken on the display head and the bolt located in the left rear side of the display head must be removed to place the normally closed C&C switch in the calibration position.

1.10 Verification Provision

Provision is made for the application of a verification mark.

1.11 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	
Model number	
Serial number	
Pattern approval number	NMI S769	
Year of manufacture	
Accuracy class	0.5	
Environmental class	I	(#1)
Liquid temperature range°C to°C	(#2)

(#1) Environmental class for printers is Class B

(#2) Required when the volume conversion for temperature facility is activated

For applications other than LPG, when the volume conversion facility is activated, the indicator reading face shall be marked 'Volume Corrected to 15°C'.

TEST PROCEDURE No S769

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.

Maximum Permissible Errors

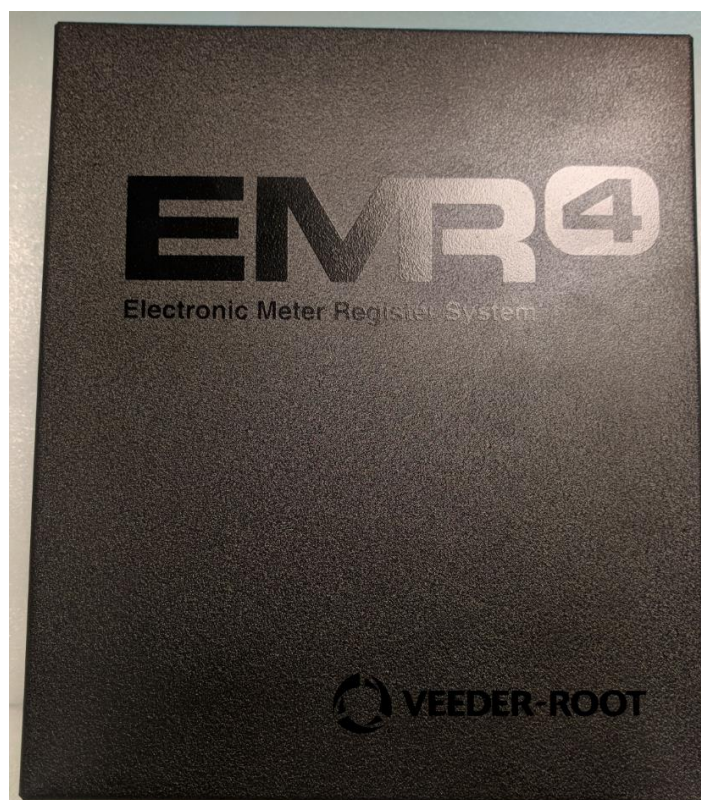
The maximum permissible errors applicable are those applicable to Liquid-measuring systems of Accuracy class 0.5, as stated in the approval documentation for the fuel dispensers or in Schedule 1 of the *National Trade Measurement Regulations 2009*.

FIGURE S769 – 1



Veeder Root Model EMR4 Calculator/Indicator for Liquid-measuring Systems

FIGURE S769 – 2



Veeder Root EMR4 Interconnection Box

FIGURE S769 – 3



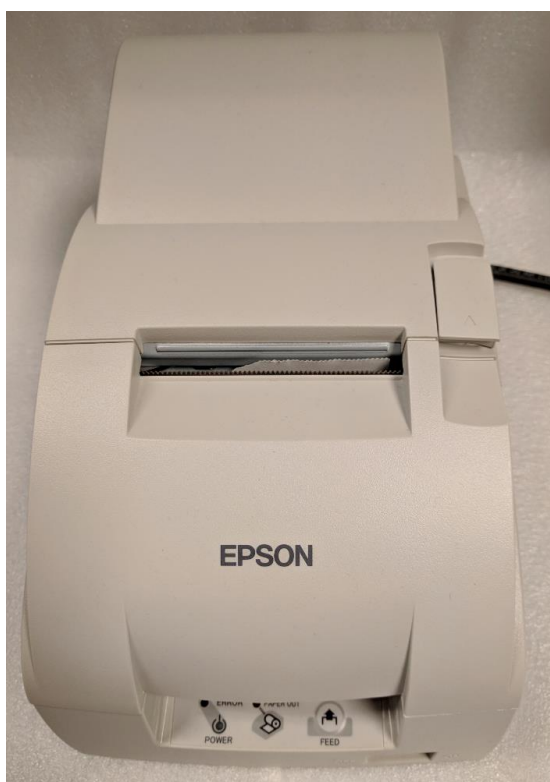
Veeder Root Model 8452 Remote Pulse Transmitter

FIGURE S769 – 4



Epson Model TM-295 Printer

FIGURE S769 –5



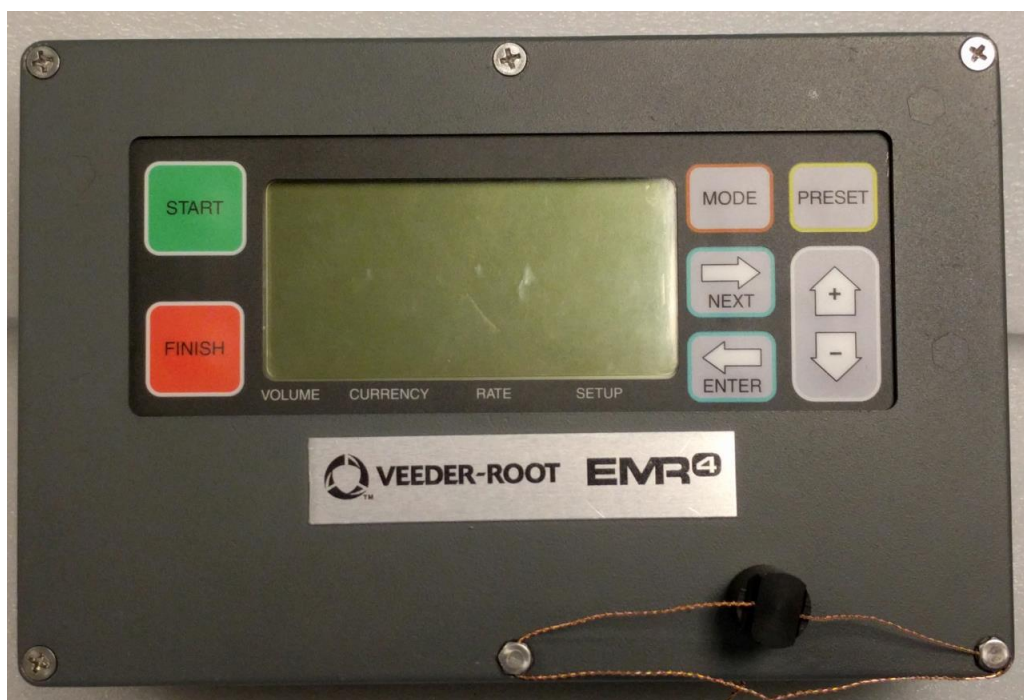
Epson Model TM-U220 Printer

FIGURE S769 – 6



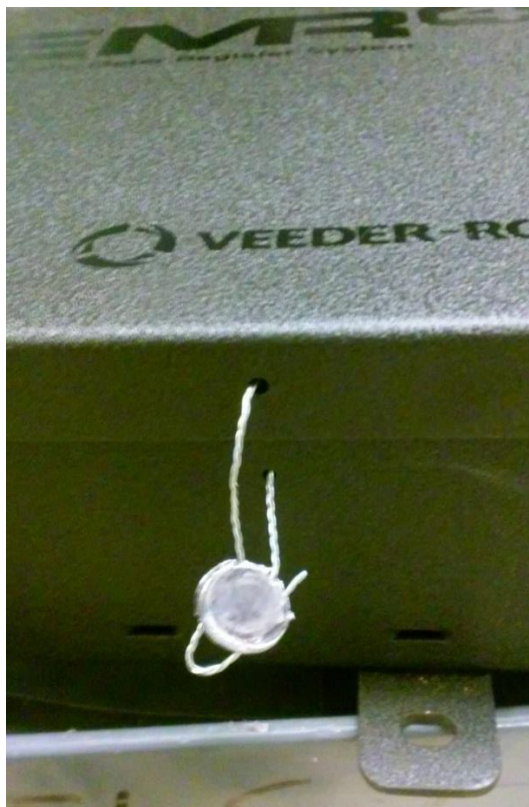
Typical Sealing of the Veeder Root Model EMR4 Meter Mounted Display Head

FIGURE S769 – 7



Typical Sealing of the Veeder Root Model EMR4 Remote Display Head

FIGURE S769 – 8



Typical Sealing of the Interconnection Box

FIGURE S769 – 9



Typical Sealing of the Remote Pulse Transmitter

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