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CERTIFICATE OF APPROVAL No 5/6H/13

This is to certify that the patterns of the

Epex Flowmeter with Liquid Controls M5 Meter

submitted by Engineering Products Pty Ltd,
418 Burnley Street,
Burnley, Victoria, 3121,

have been approved under the Weights and Measures (Patterns of Instruments) Regulations as being suitable for use for trade.

Date of Approval: 24 April 1978

The patterns are described in Technical Schedule No 5/6H/13, and in drawings and specifications lodged with the Commission.

The approval is subject to review on or after 1 May 1983.

All instruments conforming to this approval shall be marked with the approval number "NSC No 5/6H/13".

Approval is granted on condition that:

1. The "maximum flow rate" is a flow rate between 110 and 220 L/min; the minimum flow rate is 20% of the maximum flow rate achievable with a particular instrument.

2. The maximum system pressure is limited to 600 kPa.

3. The pump suction operates under a positive liquid head.

4. The liquids measured are limited to petroleum products of viscosities between 0,4 and 8,3 mPa.s.

5. The liquid (commercial or technical name) for which the instrument is verified is nominated on the instrument data plate.

Signed

Executive Officer

22/3/79

NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No 5/6H/13

Pattern: Epex Flowmeter with Liquid Controls M5 Meter

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Description:

The pattern (see Figure 1) is a vehicle-mounted or fixed-installation instrument for the delivery of liquid petroleum of viscosity between 0,4 and 8,3 mPa.s at a maximum flow rate of up to 220 L/min and a maximum system pressure at no flow of 600 kPa.

The flowmeter comprises the following:

1. Positive displacement pump mounted on the assembly at a point lower than the minimum height of the liquid in the supply tank.

The supply pipe from the tank to the pump has a continuous fall to the pump. The pump by-pass is set so that the maximum no-flow system pressure is up to 600 kPa. Provision is made for a pressure gauge to be connected between the pump and the gas purger.

2. Liquid Controls E.1-42100 gas purger (see Figure 2).

3. Liquid Controls M5 meter (see Figure 2).

4. Indicator and ticket printer (see Figure 2), comprising Veeder-Root VR 7890 indicator and ticket printer — a zero-start single-handle reset indicator and ticket printer. The ticket printer has 1 litre increments and the indicator has a scale interval of 1 litre; the first element is marked with ten scale-mark lines numbered 0 to 9. The aperture through which the first element of the indicator is viewed is widened in the direction of travel. A shutter covers the indicator elements during zero reset. The maximum speed of the first element of the indicator and ticket printer is 200 r/min.

5. Non-return valve.

6. Hose — any type, bore or length of hose may be used provided that the minimum delivery, determined from Table 1 and marked on the instrument data plate for reference by the Weights and Measures Authority, is acceptable to that Authority taking into account the usage of the instrument.

7. Anti-drain valve (see Figure 3) — an anti-drain valve, or anti-drain valve and swivel coupling, is fitted on the end of the hose. The anti-drain valve retains a pressure of not less than 55 kPa.

8. Nozzle — any nozzle with an integral anti-drain valve located downstream of the main nozzle valve. The integral anti-drain valve shall retain a pressure of not less than 5 kPa.

9. Marking — instrument data plate sealed to the instrument marked:*

(a) "approved for petrol only"; or

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* The approval for the following liquids is based upon the liquid having a viscosity within the range specified for temperatures of 5°C to 40°C, taking into account the variations in the viscosity of each product which occur with the output from a single refinery or between different refineries and at different times throughout each year:

Liquid[1]	Permitted viscosity range
Petrol	0,4 to 0,7 mPa.s
Kerosene[2]	0,6 to 2,2 mPa.s
Heating oil	1,1 to 4,0 mPa.s
Diesel fuel	1,7 to 8,3 mPa.s

Note: [1] A known trade abbreviation of the name of the liquid is acceptable.

[2] Kerosene includes white spirits and aviation turbine fuel.

(b) "approved for kerosene, heating oil, and diesel fuel";* and

(c) "minimum delivery ...y... litres", y being the minimum delivery determined from Table 1; and

(d) "maximum no-flow pressure ...x... kPa", x being the maximum system pressure when the nozzle is closed.

10. Sealing —

(a) the indicator, ticket printer and calibration-adjustment cover, by passing a sealing wire through the attachment-mounting bolts and terminating the ends beneath a lead stamping plug (see Figure 2);

(b) the instrument data plate, by attaching it by a lead stamping plug or by threading the indicator sealing wire through a hole in the data plate.

The approval includes:

1. Veeder-Root VR 7887 indicator — a zero-start indicator with a scale interval of 1 litre; the first element is marked with ten scale-mark lines numbered from 0 to 9 (see Figure 4). The aperture through which the first element is viewed is widened in the direction of travel. A shutter covers the indicator elements during the zero reset. The maximum speed of the first element of the indicator is 200 r/min.

2. A Veeder-Root 1624 (UK) or 169100 or 169200 (USA) zero-start indicator with a scale interval of 1 litre; the first element is marked with ten scale-mark lines numbered from 0 to 9 (see Figure 5). The aperture through which the first element is viewed is widened in the direction of travel.

3. A Veeder-Root 7085 zero-start single-handle reset indicator and ticket printer (see Figure 6). The ticket printer has 1 litre increments and the indicator has a scale interval of 1 litre; the first element is marked with ten scale-mark lines numbered from 0 to 9. The aperture through which the first element is viewed is widened in the direction of travel.

Special Tests:

The instrument should be tested with one or more of the liquids for

* The approval includes similar products of viscosity between 0,6 and 8,3 mPa.s.

which it will be used and which are marked on the data plate. The maximum flow rate at which the instrument is able to be tested should be the maximum flow rate marked on the instrument data plate.

1. Hose Dilation

Weights and Measures inspectors should check that the maximum hose dilation, determined by the method described below, corresponds with the minimum delivery marked on the data plate and complies with **Table 1.**

A measure of the hose-dilation quantity may be obtained by the following method:

(a) With the pump operating, open and close the nozzle, then with the nozzle closed check that the no-flow system pressure is within 20 kPa of the maximum no-flow system pressure marked on the instrument data plate.

(b) With the pump stopped and the hose fully wound on its reel, open the nozzle to reduce the pressure in the hose to the anti-drain valve retaining pressure of about 55 kPa. Then fully unwind the hose from the reel, zero the indicator, start the pump and, after allowing not less than 30 seconds for the hose to fully dilate, and with the pump still running, read the quantity on the indicator. This quantity is equal to the maximum hose dilation.

2. Gas Purging

The effect of gas on the quantity delivered should not exceed 1,0% of the minimum delivery marked on the instrument data plate when a delivery is interrupted due to the supply tank running dry, and the delivery is continued by, for example, changing supply tanks. To test gas purging it will be necessary to allow the supply tank to empty during a test delivery, to stop the pump, and to refill or change the supply tank to allow the delivery into the proving measure to be completed.

Non-flow-dependent Errors:

1. The non-flow-dependent errors are up to:

   (a) 1 litre rounding error for the ticket printer with 1 litre increments;

   (b) 0,2 litre reading error for the indicator which has the first element indicating by 1 litre scale intervals;

(c) ...w... litre gas-purging error, w being 1% of the minimum delivery marked on the instrument data plate;

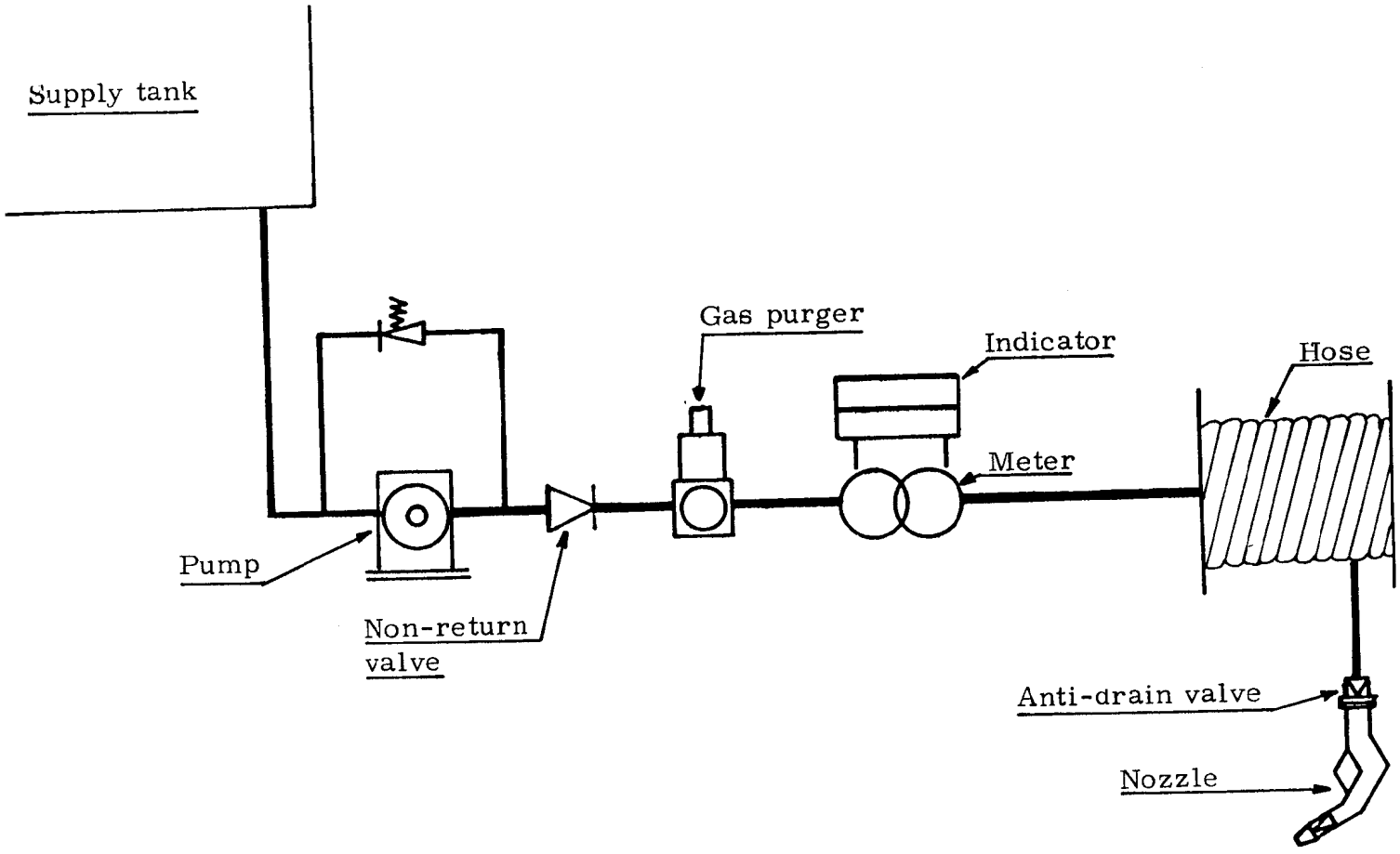
(d) ...z... litre hose dilation, z being the maximum value of hose dilation for which the instrument is verified — see Table 1.

2. The minimum delivery for which the relative error from all sources would not exceed 1,5% is derived from Table 1 and marked on the instrument data plate.

TABLE 1

Minimum delivery marked on instrument data plate	Maximum hose dilation	
	Indicator only fitted	Indicator and printer fitted
L	L	L
50	0,3	-
100	0,8	0
150	1,3	0,5
200	1,8	1,0
250	2,3	1,5
300	2,8	2,0
350	3,2	2,5
400	3,8	3,0
450	4,3	3,5
500	4,8	4,0

FIGURE 5/6H/13 - 1

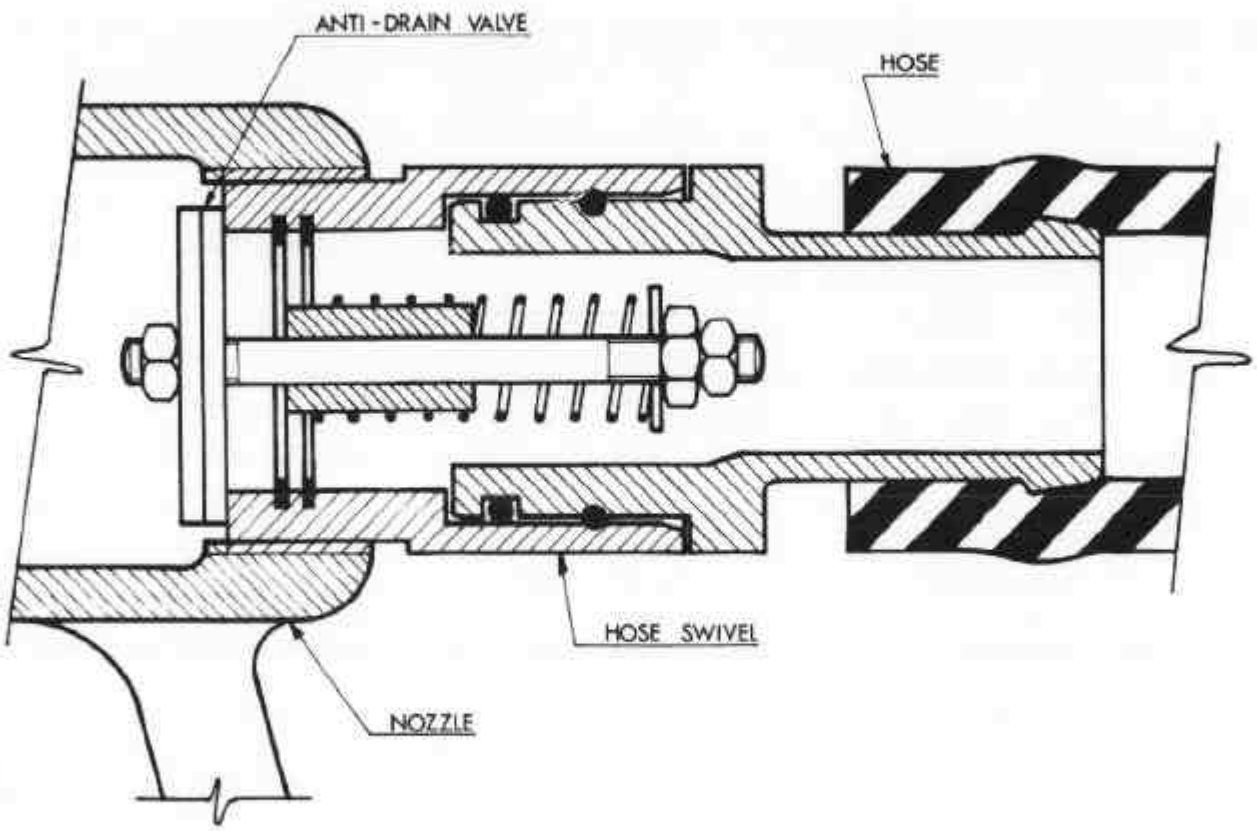


Epex Flowmeter with Liquid Controls M5 Meter — Schematic Diagram

FIGURE 5/6H/13 - 2

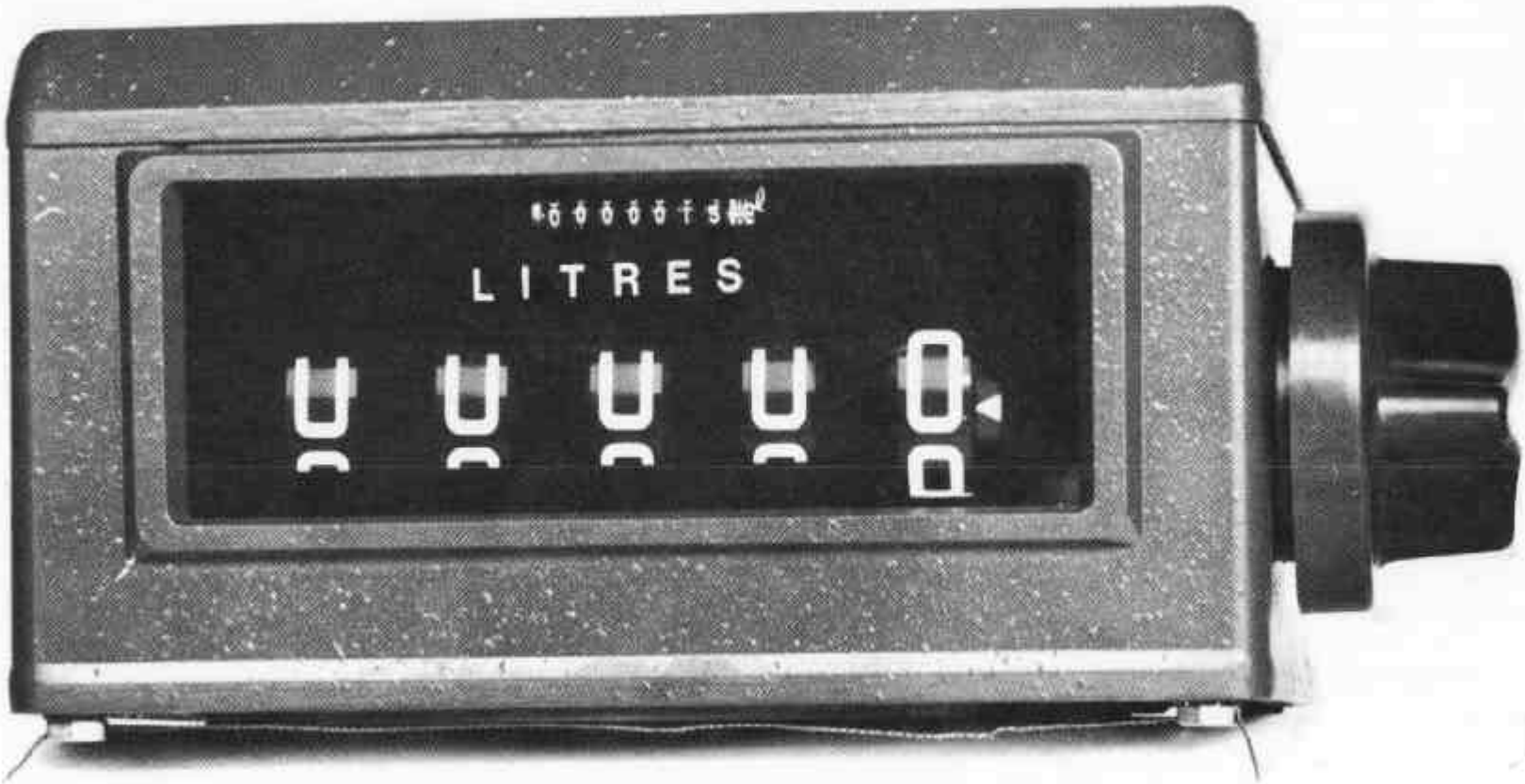
Liquid Controls M5 Meter and Gas Purger with Veeder-Root VR 7890 Ticket Printer

FIGURE 5/6H/13 - 3



Anti-drain Hose and Swivel Hose Coupling

FIGURE 5/6H/13 - 4



Veeder-Root VR 7887 Indicator

FIGURE 5/6H/13 - 5

Veeder-Root 1624 Indicator

FIGURE 5/6H/13 - 6

Veeder-Root 7085 Ticket Printer