10/1/11
24 October 2001

National Standards Commission

12 Lyonpark Road, North Ryde NSW

Cancellation

Certificate of Approval

No 10/1/11

Issued under Regulation 60
of the
National Measurement Regulations 1999

This is to certify that the approval for use for trade granted in respect of the

LPG Engineering Model Stargas EPSN LPG Driveway Flowmeter

submitted by LPG Measurement Technology Pty Ltd
85A Canterbury Road
Kilsyth VIC 3137

has been cancelled in respect of new instruments as from 1 November 2001.

Signed by a person authorised under Regulation 60 of the National Measurement Regulations 1999 to exercise the powers and functions of the Commission under this Regulation.

National Standards Commission

Certificate of Approval

No 10/1/11

Issued under Regulation 9
of the
National Measurement (Patterns of Measuring Instruments) Regulations

This is to certify that an approval for use for trade has been granted in respect of the

LPG Engineering Model Stargas EPSN LPG Driveway Flowmeter

submitted by LPG Engineering Pty Ltd
13/257 Colchester Road
KILSYTH VIC 3137.

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.

CONDITIONS OF APPROVAL

This approval is subject to review on or after 1 April 1996.
This approval expires in respect of new instruments on 1 April 1997.

Instruments purporting to comply with this approval shall be marked NSC No 10/1/11 and only by persons authorised by the submittor.

The Commission reserves the right to examine any instrument or component of an instrument purporting to comply with this approval.

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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 Commission 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 the Commission's Document 106.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate No S1/0/A.

The Commission reserves the right to examine any instrument or component of an instrument purporting to comply with this approval.

Special:

The initial verification of each driveway flowmeter shall be carried out under the supervision of a government-licensed LPG installer or a person experienced in the design and installation of LPG systems.

DESCRIPTIVE ADVICE

Pattern: approved 11 March 1991

- The pattern is an LPG Engineering model Stargas EPSN driveway flowmeter for the delivery of liquefied petroleum gas.

Variant: provisionally approved 11 March 1991
approved 30 August 1991

1. With a Production Engineering model Retron 80 indicator.

Variants: approved 11 March 1991

2. With a Neptune 32 mm gas purger.

3. With two flowmetering systems in the one housing.

4. In alternative housings.

Variant: approved 30 August 1991

5. With a Schwelm part number 840039 LPG meter.

Variant: provisionally approved 30 August 1991
approved 3 February 1995

6. With an LPG Engineering automatic density measuring device.

Technical Schedule No 10/1/11 describes the pattern and variants 1 to 6.

Variant: provisionally approved 4 December 1992
approved 3 February 1995

7. Without the vapour elimination chamber.

Technical Schedule No 10/1/11 Variation No 1 describes variant 7.

FILING ADVICE

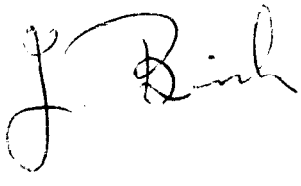
Certificate of Approval No 10/1/11 dated 31 August 1993 is superseded by this Certificate and may be destroyed.

NOTE: The Provisional status of variants 6 and 7 is hereby removed.

The documentation for this approval now comprises:

Certificate of Approval No 10/1/11 dated 20 March 1995
Technical Schedule No 10/1/11 dated 16 December 1991 (incl. Test Procedure)
Technical Schedule No 10/1/11 Variation No 1 dated 31 August 1993
Figures 1 to 5 dated 16 December 1991

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.



National Standards Commission

TECHNICAL SCHEDULE No 10/1/11

Pattern: LPG Engineering Model Stargas EPSN LPG Driveway Flowmeter.

Submittor: LPG Engineering Pty Ltd
13/257 Colchester Road
KILSYTH VIC 3137.

1. Description of Pattern

The pattern is an LPG Engineering model Stargas EPSN LPG driveway flowmeter (Figure 1) for the delivery of liquefied petroleum gas of density 0.505 to 0.545 kg/L (at 15°C), at temperatures between -5°C and +45°C.

Instruments are approved for locally or remotely-authorised operation with maximum and minimum flow rates of 60 L/min and 15 L/min respectively. Instruments may be used with compatible control consoles which have been Commission-approved for use with the type of indicator fitted to the flowmeter.

1.1 Component Structure

The component parts of each driveway flowmeter comprise components as detailed below. The hydraulic diagram of a dual flowmeter is shown in Figure 2.

(i) **Supply Tank**

The supply tank may be located above or below ground.

(ii) **Pump**

The pump may be positioned above the supply tank (*), in which case the pump shall be specifically designed for use with LPG in **negative suction head** installations. Alternatively, the pump shall be positioned below the supply tank so that it is always in a state of flooded suction (**positive suction head**). There shall be no restrictive fittings within ten pipe diameters of the pump inlet. The inlet pipe to the pump is larger than the outlet from the pump. The external pump by-pass relief valve is installed in a line returning to the supply tank.

(*) Only when fitted with the vapour detection/elimination system - see cl. (iv).

(iii) **Meter**

A Nuovo Pignone model TLO 1254404 two-piston LPG meter is used.

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(iv) **Vapour Detector**

The meter is protected from the measurement of vapour by correct installation and by an LPG Engineering model EVE-10 electronic vapour detection/elimination system. The system is vented via a vapour return line of not less than 20 mm in diameter to the vapour space in the supply tank. A temperature sensor, a thermometer pocket, a liquid level sensor, a bleed valve, and provision for a pressure gauge are incorporated into the vapour eliminator.

The leads to the vapour sensor connection plug (on the top of the vapour eliminator) are encased in insulating material.

Mounted on the end of the vapour sensor junction box is a yellow or a green LED which will illuminate to indicate the presence of vapour.

(v) **Driveway Flowmeter Indicator**

An Eclipse MVR79 series electronic driveway flowmeter indicator is used and is driven from the output shaft of the meter.

Volume	999.99 L in 0.01 L increments
Unit Price	999.9 c/L in 0.1 c increments
Price	$999.99 in 1 c increments

The operating cycle is started by removing the nozzle from its receptacle. The displays will be cleared of any previous sale and the remote pump will start. After a delay of about 6 seconds a segment check is initiated; when completed only the unit price is displayed. At the end of this cycle a solenoid valve opens. Provided that the nozzle has been attached to a receiving container, which may be done at any time during the cycle, filling can now commence. Replacement of the nozzle stops the remote pump but allows the details of the delivery to remain until the next reset cycle.

(vi) **Electronic Temperature Conversion**

Temperature conversion is achieved by means of an electronic convertor built into the Eclipse MVR79 indicator.

The probe for the convertor is located in the stream of liquid close to the meter inlet. The electronic probe circuitry senses changes of temperature in the liquid, and the MVR79 adjusts the indicated volume to the equivalent volume at 15°C.

The temperature convertor is fitted with an integrated circuit programmed with one of the tables of ASTM IP Table 54, for particular density values within the range 0.505 to 0.545 kg/L. The integrated circuit (IC) fitted is chosen to suit the density of the liquid being used (and as marked on the data plate), as follows:

IC for 0.510 kg/L used for densities 0.505 to 0.515 kg/L;
IC for 0.520 kg/L used for densities 0.515 to 0.525 kg/L;
IC for 0.530 kg/L used for densities 0.525 to 0.535 kg/L; and
IC for 0.540 kg/L used for densities 0.535 to 0.545 kg/L;

Fifteen seconds after the nozzle has been returned into its receptable, pressing the TOTALS (or TOTES) button in the middle of the indicator will display the following:

Cumulative Dollars Sold in Whole Dollars
Cumulative Volume Sold in Whole Litres
Temperature Display

On release of the button the display will revert to the previous sale information.

The temperature display is an indirect display of the temperature that the probe is reading. The display can be converted into degrees Celsius by the following:

$$\frac{\text{Temperature Display} - 20}{2} = \text{Liquid Temperature in } ^{\circ}C$$

For testing purposes a switch is provided to deactiviate the temperature converting function. When the electronic temperature convertor is deactivated the temperature display will show "50".

(vii) **Solenoid Valve**

A 20 mm solenoid valve is located downstream of the meter. The valve is controlled by the computing indicator and by the vapour eliminator to prevent delivery during the reset cycle and when vapour has been detected.

(viii) **Vapour Indicator**

Presence of vapour is indicated by illumination of either a yellow or a green LED mounted on the end of the vapour sensor junction box -refer cl. 1.1 (iv).

(ix) **Outlet Piping**

The pipe connection from the meter to the hose is fitted with an air-operated ball valve, a check valve and an excess flow valve.

(x) **Hose**

The dispenser is fitted with a hose of either 12.5 mm or 20 mm bore, complying with the SAA code for hoses in use with liquefied petroleum gases.

The hose is supported on a hose mast and is fitted with a hose break coupling which will break with a loss of no more than 15 ml of liquid in the event of an excessive pull on the nozzle.

(xi) **Nozzle**

The nozzle used is either a Gilbarco model 102-ZVG 1.3, also known as an Elaflex, as described in the documentation of NSC approval No S158, or a Gasguard model L.G. 1.

(xii) **Pressure Equalisation**

Provision is made for a vapour line from the vapour space in the supply tank to a pressure prover used for testing, either directly or via a tee in the vapour return line from the vapour eliminator. During a normal delivery there is no vapour return connection between the receiving container and the supply tank.

1.3 Sealing and Verification/Certification Provision

The indicator and meter calibration adjustments are sealed. Alternatively, the computer calibration adjustments may be sealed. Only one side of the computer is sealed.

The temperature convertor ON/OFF switch, and the vapour sensor junction box are sealed.

Provision is made for the application of a verification/certification mark.

1.2 Markings

The instrument data plate permanently fixed to the external housing of the driveway flowmeter is marked with the following:

Manufacturer's name or mark	
Year of manufacture	
Serial number	
NSC approval number	NSC No 10/1/11
Maximum flow rate	..... L/min
Minimum flow rate	..... L/min
Liquid temperature range	... °C to ..... °C
Approved for LPG of density range	0.505 to 0.545 kg/L
Density for which temperature convertor is set (#)	..... kg/L
Maximum operating pressure	2450 kPa

(#) The density marked shall correspond to the particular integrated circuit fitted to the indicator, which is chosen to suit the density of the product - Refer cl. 1.1 (vi).

2. Description of Variants

2.1 Variant 1

With a Production Engineering model Retron 80 electronic computing indicator replacing the indicator of the pattern, and now approved for use at temperatures between 0°C and +45°C. The indicator incorporates automatic electronic temperature conversion. Instruments are known as models R***, e.g. the pattern (model EPSN) becomes model RPSN (Figure 3).

The unit price change/test button is located on the computer unit. The operating cycle is similar to that of the pattern. The probe for the temperature convertor is located in the stream of liquid in the vapour eliminator, together with the liquid level sensor of the vapour detector/eliminator.

Adjacent to the existing red diagnostic LED's on the indicator, a yellow or a green LED is fitted which will illuminate to indicate the presence of vapour.

Fifteen seconds after the nozzle has been returned to its receptacle, pressing the unit price change/test button 16 times will cause the indicator to display the standard Retron 80 diagnostics. This display will be repeated 4 times and then change to the special display for LPG. The top row of digits is the liquid density for which the temperature convertor is set; the centre row will show the current K factor and the bottom display is the temperature that the probe is reading in degrees Celsius.

Removing the nozzle from its receptacle cancels the diagnostic display and initiates the normal operating cycle.

As for the indicator of the pattern, the density value is set by fitting a particular integrated circuit to suit the density of the liquid being used. In addition to the markings required for the pattern (cl. 1.2 Markings) the markings shall include a notice stating that the density for which temperature convertor is set may be displayed using the diagnostic display of the flowmeter indicator.

2.2 Variant 2

With a Neptune 32 mm gas purger (Figure 4) and a differential valve replacing the vapour detection/elimination system of the pattern.

The pump shall be located below the supply tank in a positive suction head (flooded suction) arrangement and is positioned as close as possible to the tank.

2.3 Variant 3

With two flowmetering systems in the one housing. Instruments are known as models **D*, e.g. the pattern (model EPSN) becomes model EPDN.

2.4 Variant 4

In alternative housings. Instruments are known as models ****-R, or ****-M, e.g. the pattern (model EPSN) becomes model EPSN-R when in a round housing, or model EPSN-M when in a multi-product style housing. Figure 5 shows a model EPDN-M dual driveway flowmeter in a multi-product style housing.

2.5 Variant 5

With a Schwelm part number 840039 two-piston meter (Figure 4) replacing the meter of the pattern. Instruments are known as models ***S, e.g. the pattern (model EPSN) becomes model EPSS.

2.6 Variant 6

With an LPG Engineering automatic density measuring device for use only in conjunction with the LPG Engineering model EVE-10 vapour detection/elimination system (as described for the pattern) which is then known as a model EVE-10D. The system may only be used with the Production Engineering model Retron 80 indicator (as described for variant 1).

The density device includes a sensor which is incorporated with the temperature and vapour detection sensors in the vapour eliminator. The sensor detects any change in the dielectric constant of the liquid flowing through the sensor and a signal is sent to the Retron 80 indicator to enable automatic temperature conversion to be carried out for the appropriate density.

If the sensor detects vapour, an error signal is provided.

The temperature convertor included in the Retron 80 indicator has been programmed with 4 conversion tables corresponding to ASTM IP Table 54 for densities between 0.505 and 0.545 kg/L. The particular table to be used is chosen automatically depending on the density of the liquid as measured by the density device, as follows:

Table for 0.510 kg/L used for densities 0.505 to 0.515 kg/L;
Table for 0.520 kg/L used for densities 0.515 to 0.525 kg/L;
Table for 0.530 kg/L used for densities 0.525 to 0.535 kg/L; and
Table for 0.540 kg/L used for densities 0.535 to 0.545 kg/L.

The table currently in use may be displayed on the Retron 80 indicator by pressing the PRICE SET button 15 or more times when the temperature convertor is activated. (When the convertor is deactivated, a value of 0.510 is displayed, irrespective of the actual density of the liquid.) The display actually shows the specific gravity i.e. the density value without units e.g. 0.520 not 0.520 kg/L.

TEST PROCEDURE

Instruments should be tested in accordance with any tests included in the approval documentation for the indicator used, and in accordance with any relevant tests specified in the Inspector's Handbook.

Maximum Permissible Errors at Verification/Certification

The maximum permissible errors applied during a verification test from normal flow rate to the minimum flow rate specified in the Certificate of Approval or Technical Schedule are:

±1.0% with the temperature convertor deactivated; and

±1.2% with the temperature convertor activated.

The following test procedure is to be used at each six-monthly calibration test. The tests are to be arranged so that one is carried out in the hotter period of each year and the other in the cooler period. One test should also be arranged when there is a low liquid level in the supply tank.

1. Meter Test With Temperature Convertor Deactivated

(i) Carry out at least three runs at the normal flow rate at which the meter is used.

(ii) Repeat the above test with the flow rate set at 15 L/min.

2. Meter Test With Temperature Convertor Activated

Repeat the above tests and calculate the equivalent volume that would have been delivered at 15°C using the temperature indicated at the meter and the appropriate ASTM-IP Petroleum Measurement Tables, for the density of the liquid for which the temperature convertor is set.

3. Test of Vapour Detection/Elimination System

During a delivery, press the button adjacent to the temperature convertor ON/OFF switch. When this is held down, the vapour return solenoid will open and the vapour indicator LED, on the indicator or on the vapour sensor junction box, will illuminate.

4. Test of Automatic Density Measuring Device

Check that the conversion table currently in use corresponds to the density of the product being measured by pressing the PRICE SET button 15 or more times when the temperature convertor is activated. The Retron 80 indicator will display the table in use. (refer to Technical Schedule cl. 2.6 for Variant 6)

National Standards Commission

TECHNICAL SCHEDULE No 10/1/11

VARIATION No 1

Pattern: LPG Engineering Model Stargas EPSN LPG Driveway Flowmeter.

Submittor: LPG Engineering Pty Ltd
13/257 Colchester Road
KILSYTH VIC 3137.

1. Description of Variant 7

With the LPG Engineering model EVE-10 electronic vapour detection/elimination system described for the pattern modified by removing the vapour elimination chamber and return solenoid valve.

National Standards Commission

NOTIFICATION OF CHANGE

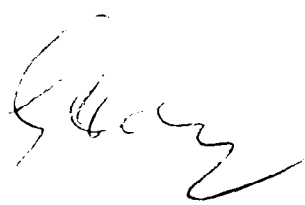
VARIOUS CERTIFICATES OF APPROVAL

The following changes are made to the approval documentation for various LPG flowmeter approvals as listed below:

In the approvals listed below, remove from the Certificate, Technical Schedule and Test Procedure, any Condition of Approval or clause that refers to instruments being verified, re-verified or calibrated at specific intervals. (Note that the re-verification period is determined by the Trade Measurement Authority in the State or Territory in which the instrument is located.)

APPROVAL NUMBER	PATTERN
10/1/2	Halco Neptune 32/38 mm LPG Flowmeter
P10/1/3	Acme Model LGD 100 LPG Driveway Flowmeter
10/1/3A	Acme Model LGD 105S LPG Driveway Flowmeter
P10/1/5	Batchen Model Mk II LPG Driveway Flowmeter
P10/1/6	Wayne Model ELC1 LPG Driveway Flowmeter
10/1/6A	Email Model ELC1 LPG Driveway Flowmeter
P10/1/7	Indeng Model MKO LPG Driveway Flowmeter
10/1/8	Gilbarco Model T093D LPG Driveway Flowmeter
10/1/8A	Gilbarco Model T093D LPG Driveway Flowmeter
10/1/9	Batchen Model Commander LPG Driveway Flowmeter
P10/1/10	LPG Engineering Model Stargas LPG Driveway Flowmeter
10/1/10A	LPG Engineering Model Stargas LPG Driveway Flowmeter
10/1/11	LPG Engineering Model Stargas EPSN LPG Driveway Flowmeter
10/1/12	CleverHead Model 93 LPG Driveway Flowmeter
10/1/13	Batchen Model SCB Commander LPG Driveway Flowmeter
P10/2/2	Liquid Controls Model MA-7-GY-10 Bulk LPG Flowmeter
10/2/3	Neptune Model 4D 32 mm Bulk LPG Flowmeter
P10/2/4	Euromatic Model FL 11/2-125 Turbine Bulk LPG Flowmeter

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.



National Standards Commission

NOTIFICATION OF CHANGE

CERTIFICATE OF APPROVAL No 10/1/11

CHANGE No 1

The following change is made to the approval documentation for the

LPG Engineering Model Stargas EPSN LPG Driveway Flowmeter

submitted by LPG Engineering Pty Ltd
13/257 Colchester Road
Kilsyth VIC 3137.

Certificate of Approval No 10/1/11 dated 31 August 1993 should be replaced by the Certificate attached herein in which the Provisional status and Conditions of Approval for variants 6 and 7 have been removed.

Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.

National Standards Commission

Notification of Change

Certificate of Approval No 10/1/11

Change No 2

The following changes are made to the approval documentation for the

LPG Engineering Model Stargas EPSN LPG Driveway Flowmeter

submitted by LPG Measurement Technology Pty Ltd
(formerly submitted by LPG Engineering Pty Ltd)
85A Canterbury Road
Kilsyth VIC 3137.

In Certificate of Approval No 10/1/11 dated 20 March 1995;

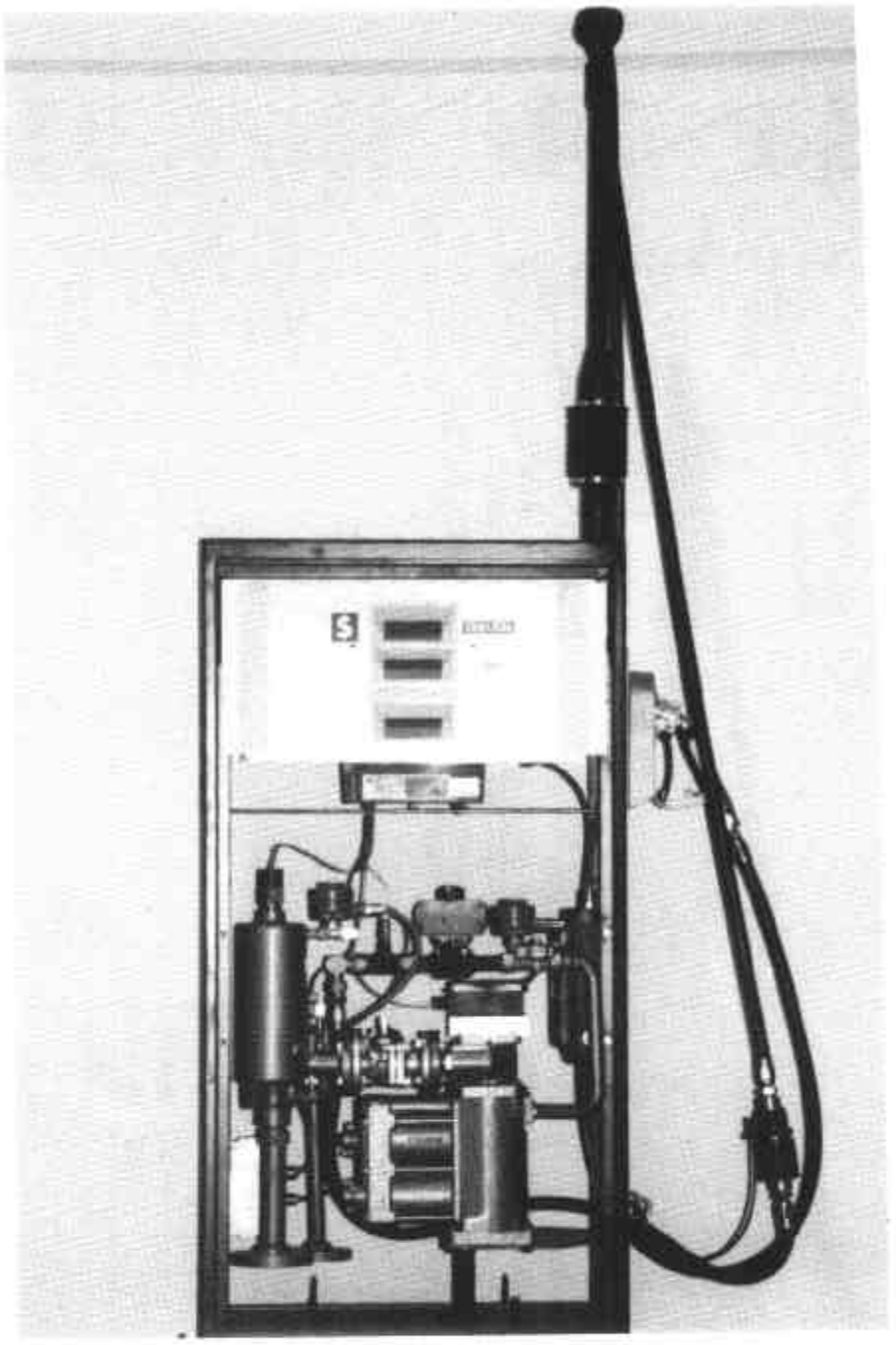
1. The Condition of Approval referring to the review of the approval should be amended to read:

   This approval becomes subject to review on 1 April 1996, and then every 5 years thereafter.

2. The Condition of Approval referring to the expiry of the approval should be deleted.

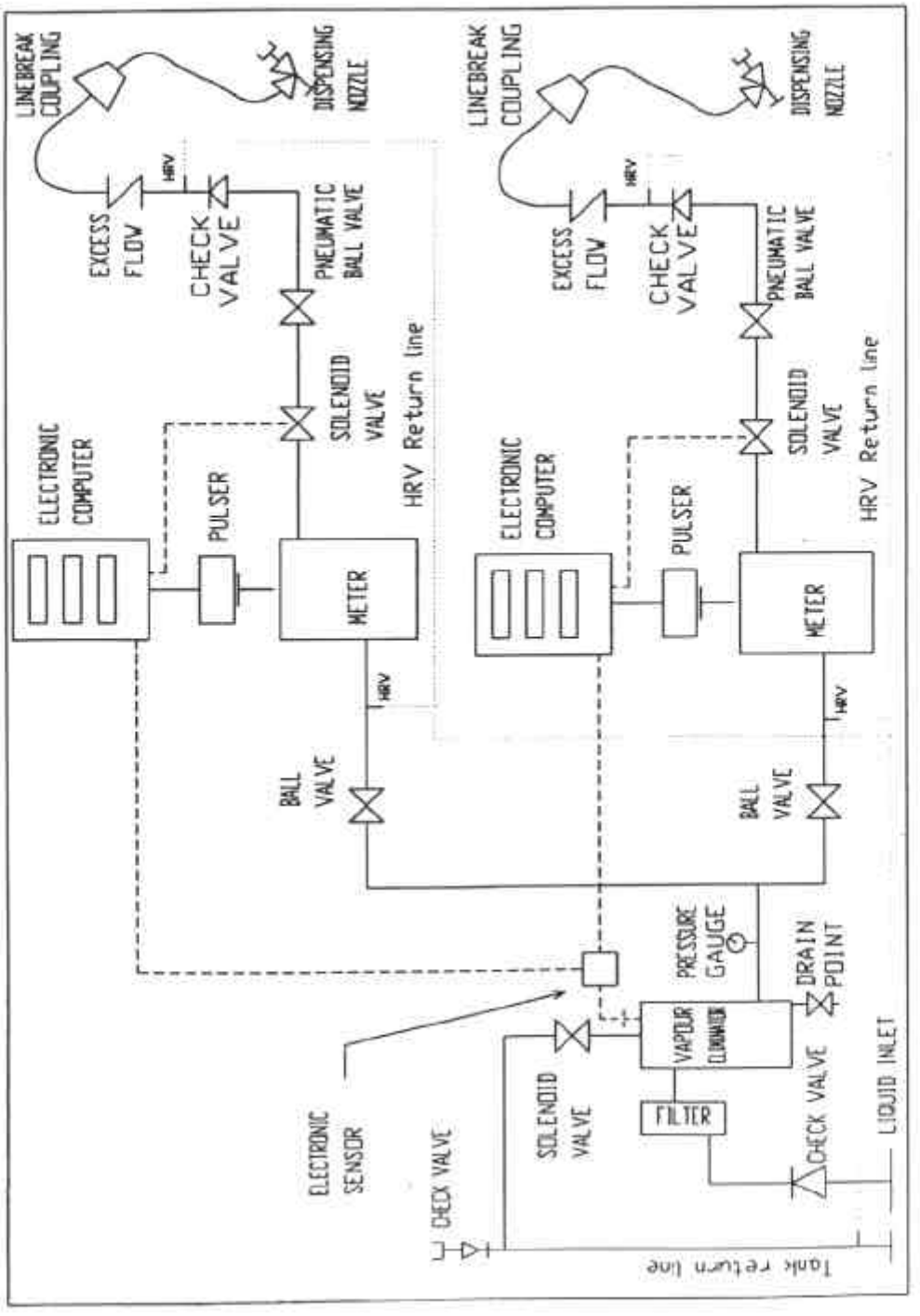
Signed and sealed by a person authorised under Regulation 9 of the National Measurement (Patterns of Measuring Instruments) Regulations to exercise the powers and functions of the Commission under this Regulation.

FIGURE 10/1/11 - 1



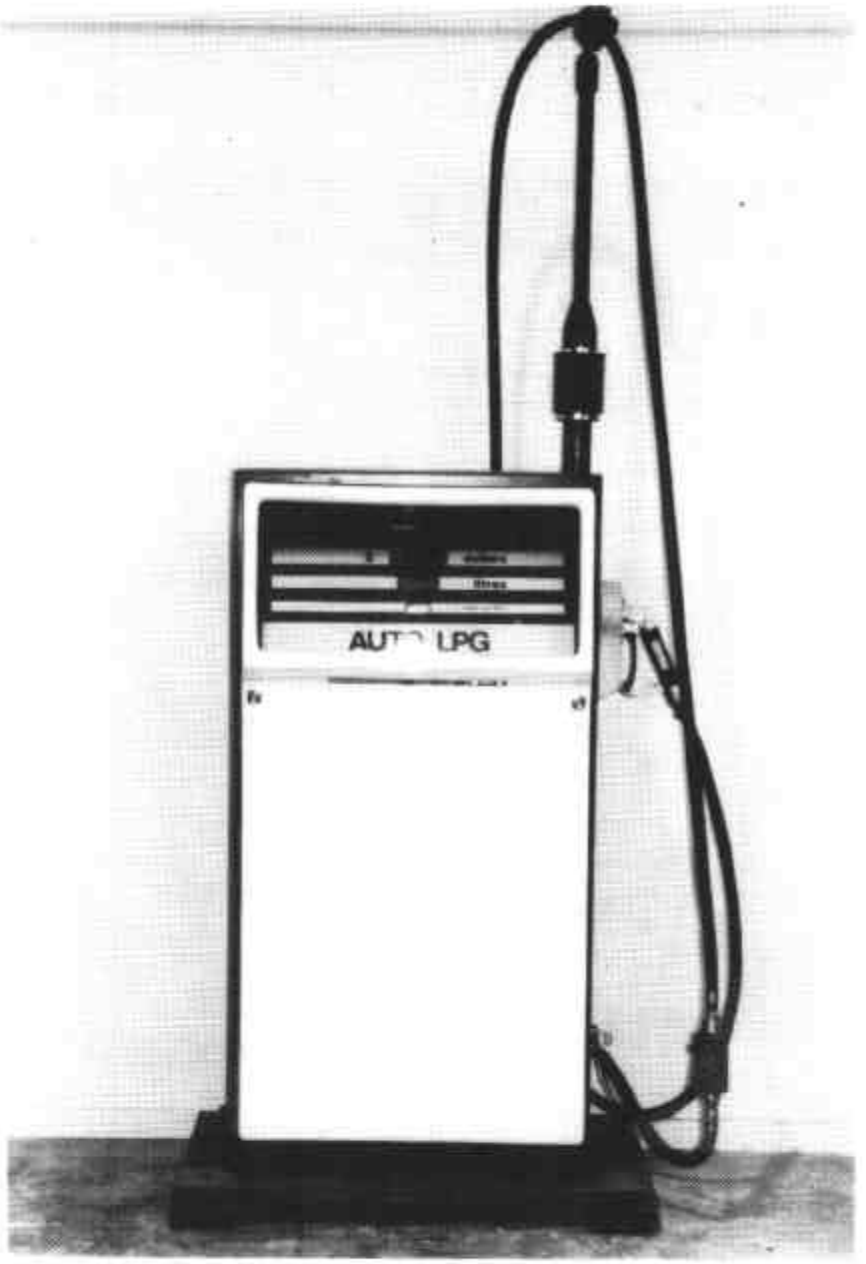
LPG Engineering Model EPSN LPG Driveway Flowmeter

FIGURE 10/1/11 - 2



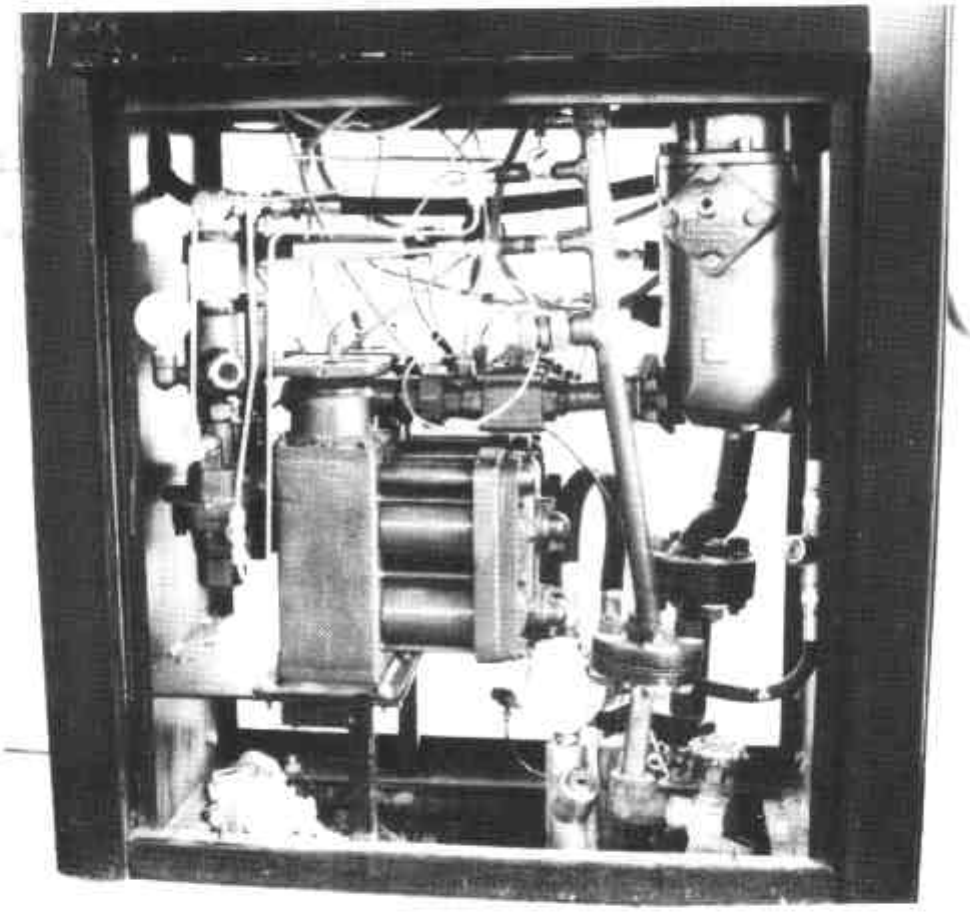
Typical (Dual) Hydraulic Diagram

FIGURE 10/1/11 - 3



Model RPSN LPG Driveway Flowmeter (Variant 1)

FIGURE 10/1/11 - 4



Showing Neptune Gas Purger and Schwelm Meter

FIGURE 10/1/11 - 5

Model EPDN-M LPG Driveway Flowmeter (Variant 4)