National Standards Commission

Certificate of Approval

No 10/1/3B

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

Acme Model LGD 106D LPG Driveway Flowmeter

submitted by Acme Fluid Handling Pty Ltd
50 Greens Road
DANDENONG VIC 3175.

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 Certificate is issued upon completion of a review of NSC approval No 10/1/3A.

CONDITIONS OF APPROVAL

This approval is subject to review on or after 1 February 1998.
This approval expires in respect of new instruments on 1 February 1999.

Instruments purporting to comply with this approval shall be marked NSC No 10/1/3B and only by persons authorised by the submittor.

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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.

The Commission 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 14 September 1994

- An Acme model LGD 106D dual LPG driveway flowmeter.

Variant: approved 14 September 1994

1. Model LGD 106S single LPG driveway flowmeter.

2. In alternative housings.

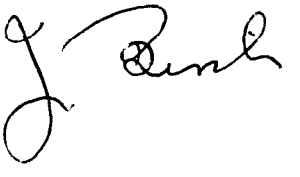
Technical Schedule No 10/1/3B describes the pattern and variants 1 and 2.

FILING ADVICE

The documentation for this approval comprises:

Certificate of Approval No 10/1/3B dated 31 January 1995
Technical Schedule No 10/1/3B dated 31 January 1995 (incl. Test Procedure)
Figures 1 to 6 dated 31 January 1995

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 10/1/3B

Pattern: Acme Model LGD 106D LPG Driveway Flowmeter.

Submittor: Acme Fluid Handling Pty Ltd
50 Greens Road
Dandenong VIC 3175.

1. Description of Pattern

The pattern is an Acme model LGD 106D dual driveway flowmeter (Figures 1 and 2) for the delivery of liquefied petroleum gas of density 0.505 kg/L to 0.545 kg/L (at 15°C), at liquid temperatures between -5°C and +45°C.

Instruments are approved for locally or remotely-authorised operation with maximum and minimum flow rates of 50 L/min and 10 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 driveway flowmeter includes the major components as detailed below. For simplicity, the hydraulic diagrams shown in Figures 2 and 3 are of a model LGD 106S single flowmeter.

(i) Supply Tank

The supply tank may be located above or below ground.

(ii) Pump

The pump shall be positioned below the supply tank so that it is always in a state of flooded suction (**suction head**). Alternatively, the pump may be positioned above the supply tank, in which case the pump shall be specifically designed for use with LPG in **suction lift** installations.

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.

(iii) Meter

A Batchen model MkI or MkII two-piston liquefied petroleum gas meter (Figure 4) is used.

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(iv) Vapour Eliminator

The meter is protected from the measurement of vapour by correct installation and by a Batchen model BVE-1 constant bleed vapour eliminator (Figure 5). The vapour eliminator incorporates a strainer and is vented through a non-return valve, via a vapour return line to the vapour space in the supply tank.

A thermometer pocket is situated at the top of the vapour eliminator.

(v) Driveway Flowmeter Indicator

An Email model Eclipse MVR79S electronic driveway flowmeter indicator with a model ELS/42 remote pulser is used. The pulser is mounted on the meter and is driven directly by the meter output shaft.

Volume	999.99 L in 0.01 L increments
Unit Price	999.9 c/L in 0.1 c/L increments
Price	$999.99 in 1 c increments
Totaliser Volume	9999999 L in 1 L increments

The operating cycle is started by removing the nozzle from its receptacle. The display will be cleared of any previous sale and the remote pump will start. After a short delay 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.

If filling is not commenced within 20 seconds after removing the nozzle from its receptacle (i.e. the solenoid being actuated), the pump motor and system will shut down and the sale will be terminated.

(vi) Electronic Volume Conversion for Temperature Device

Volume conversion for temperature is achieved by means of an electronic converter built into the Eclipse MVR79S indicator.

The probe for the conversion device is located in the top of the vapour eliminator and senses the temperature of the liquid; the device converts the measured volume to the equivalent volume at 15°C.

The volume 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 kg/L 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 receptacle, 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:

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

For testing purposes a switch is provided to deactivate the volume conversion device. When the convertor is deactivated the temperature display will show '50'.

(vii) Differential Valve

A Batchen model BDV-1 spring-loaded-piston pressure differential valve (Figure 6) maintains pressure in the metering unit and prevents the formation of vapour.

A pressure-equalising pipe is connected from the top of the differential valve to the supply tank, through the vapour return line from the vapour eliminator vent.

A sightglass flow indicator is incorporated in the outlet of the pressure differential valve, downstream of the meter. A pressure gauge is fitted in the differential valve pressure-equalising pipe.

The differential valve may be fitted with one or more bleed valves. In normal operation, these valves shall be capped and sealed.

(viii) Solenoid Valve

A 20 mm solenoid valve is located downstream of the meter. The valve is controlled by the computing indicator and prevents delivery during the reset cycle.

(ix) Outlet Pipe

The pipe connection from the differential valve, between the solenoid valve and the hose is fitted with an hydraulic accumulator which prevents meter creep and separation of the hose break coupling caused by excessively high hose pressures.

(x) Hose

The dispenser is fitted with a hose of 15 mm or 20 mm bore, complying with the SA 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 S158A or a Gasguard model LG1 liquefied petroleum gas nozzle. The nozzle can only be removed from the vehicle tank once the trigger has been released, at which time a small loss of liquid will be evident.

An optional key-operated or solenoid-operated nozzle latch may be fitted.

(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.

1.2 Sealing Provision

The side of the MVR79S indicator which provides access to the electronic calibrator shall be sealed. The mechanical calibrators fitted to the top of each meter cylinder shall be sealed.

The volume conversion device switch, the vapour return line provided for pressure equalisation during testing with a pressure prover, and any bleed valves downstream of the meter shall also be sealed.

1.3 Verification/Certification Provision

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

1.4 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	
Model number	
Serial number	
NSC approval number	NSC No 10/1/3B
Maximum flow rate	..... L/min
Minimum flow rate	..... L/min
Liquid temperature range	-5°C to +45°C
Approved for LPG of density range	0.505 to 0.545 kg/L
Density for which volume convertor is set	..... kg/L
Maximum operating pressure	2450 kPa

2. Description of Variants

2.1 Variant 1

With one flowmetering system and known as the Acme model LGD106S single LPG driveway flowmeter.

2.2 Variant 2

In alternative housings, e.g. 'round' and 'Email MPP' styles.

TEST PROCEDURE

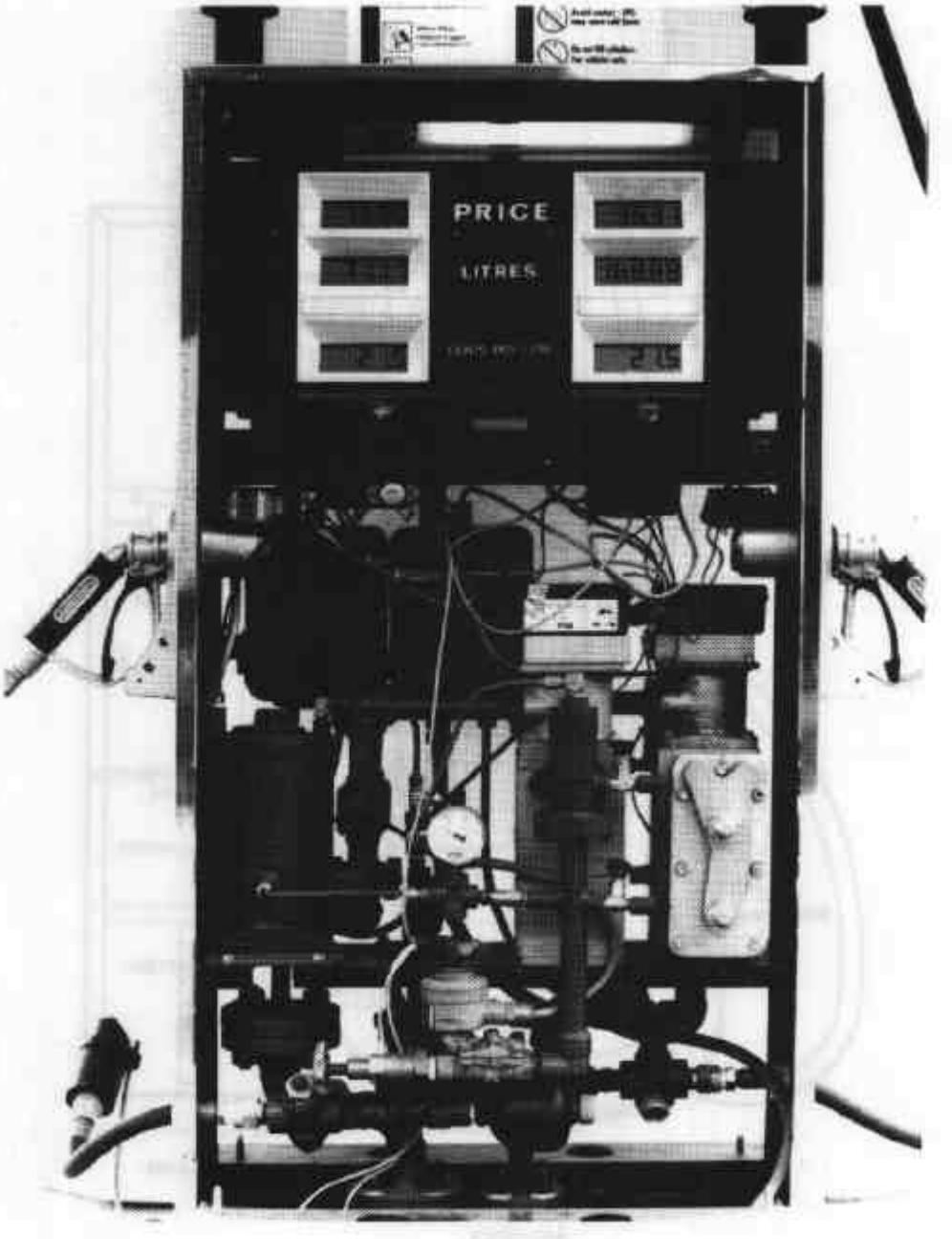
Instruments should be tested in accordance with tests included in the approval documentation for the control console used (where fitted), and in accordance with all relevant tests specified in the Inspector's Handbook.

Maximum Permissible Errors at Verification/Certification

The maximum permissible errors applied during a verification test are:

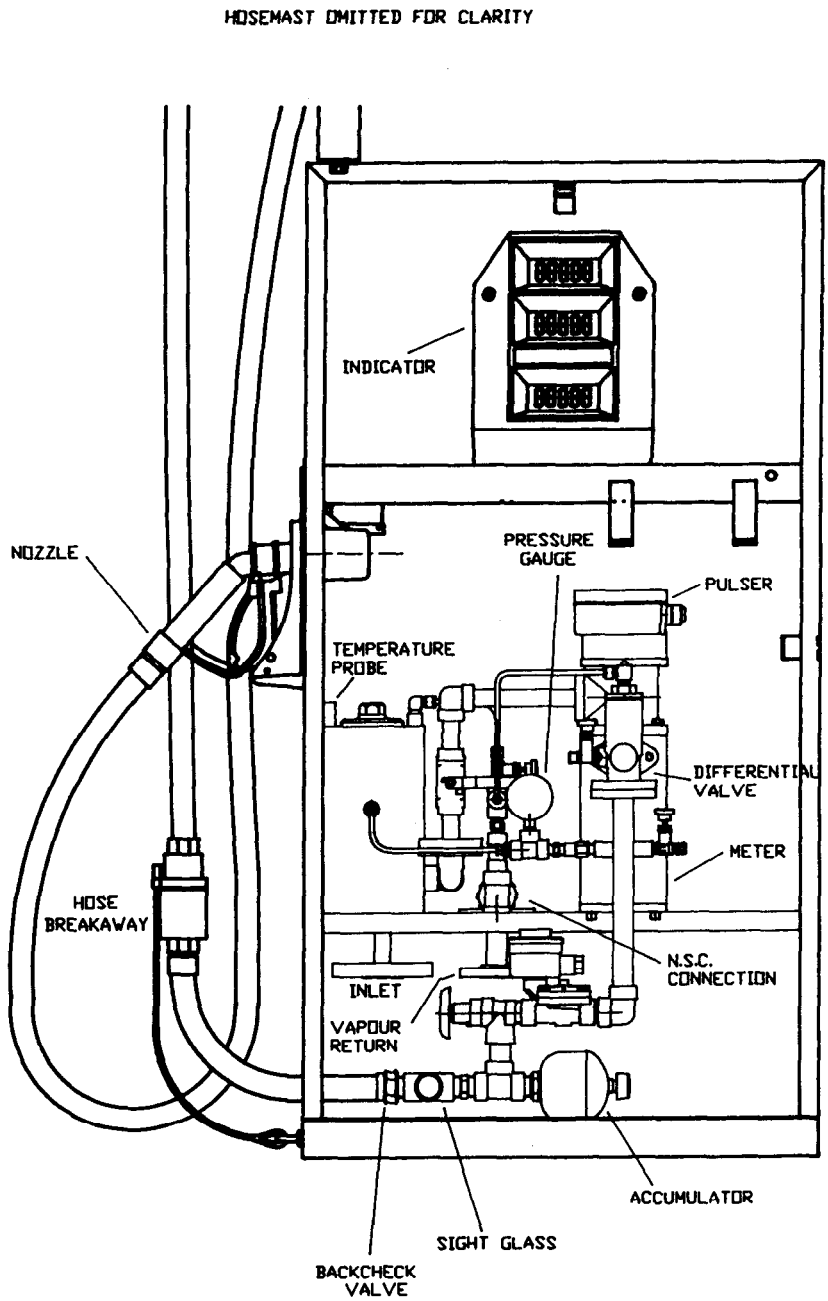
±1.0% with the volume conversion for temperature device deactivated; and
±1.2% with the volume conversion for temperature device activated.

FIGURE 10/1/3B - 1



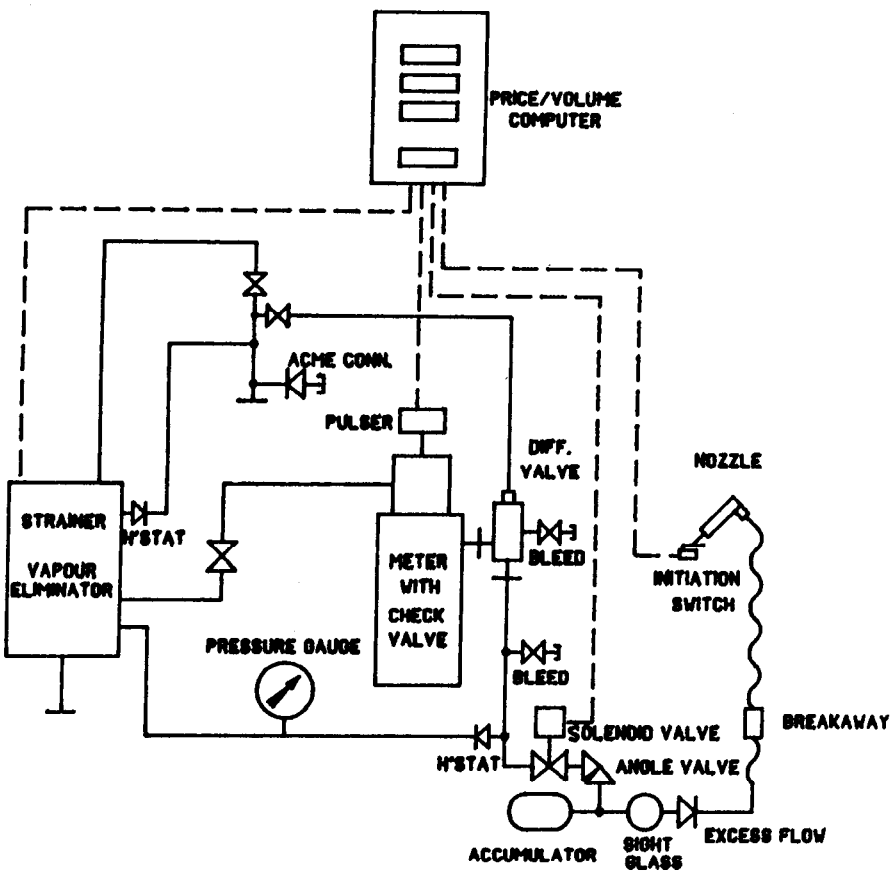
Acme Model LGD 106D LPG Driveway Flowmeter

FIGURE 10/1/3B - 2



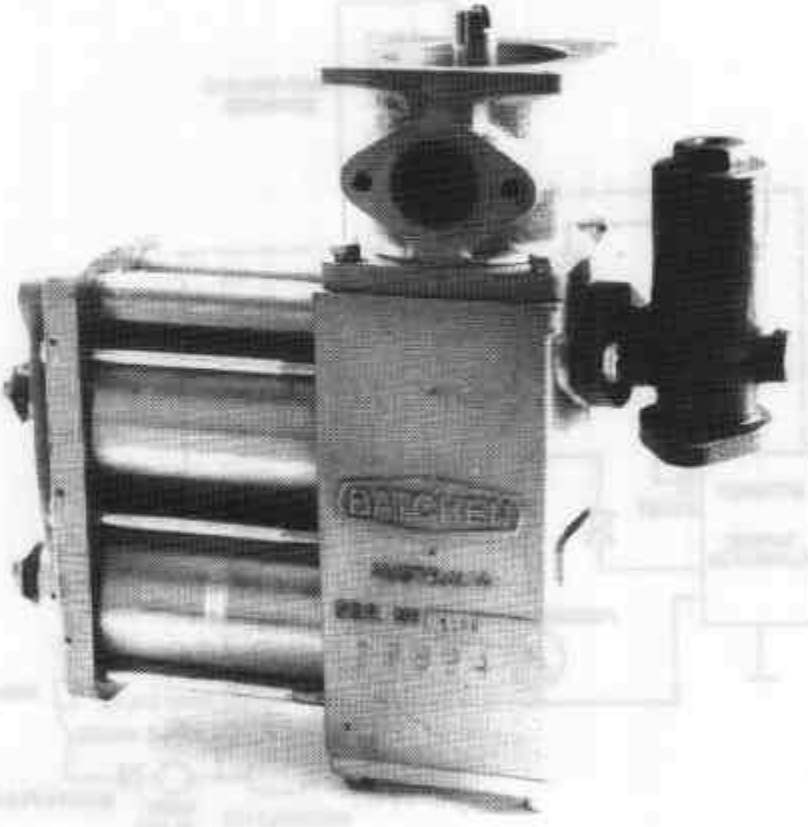
Model LGD 106S Single Hydraulics

FIGURE 10/1/3B - 3



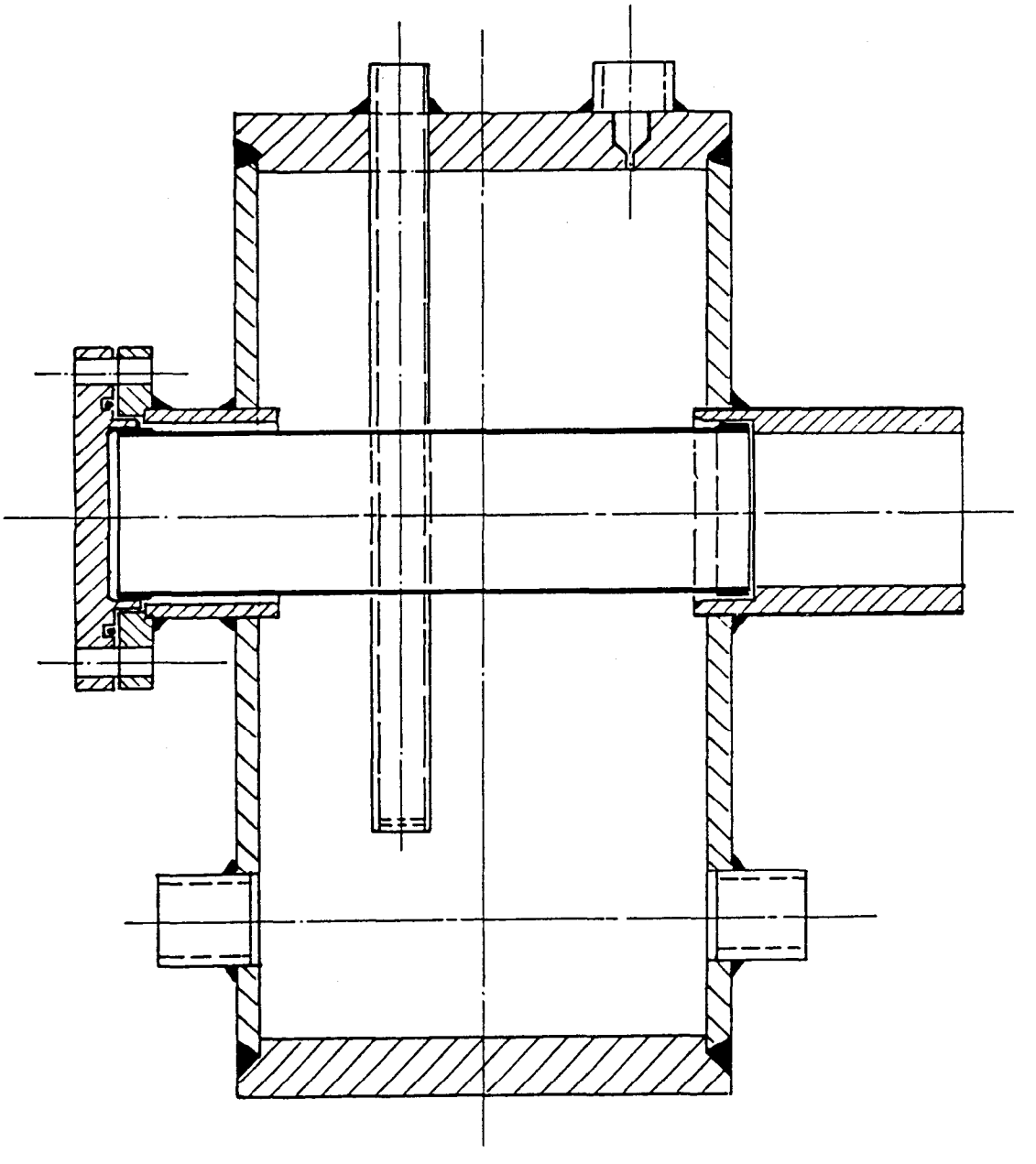
Model LGD 106S Single Hydraulics

FIGURE 10/1/3B - 4



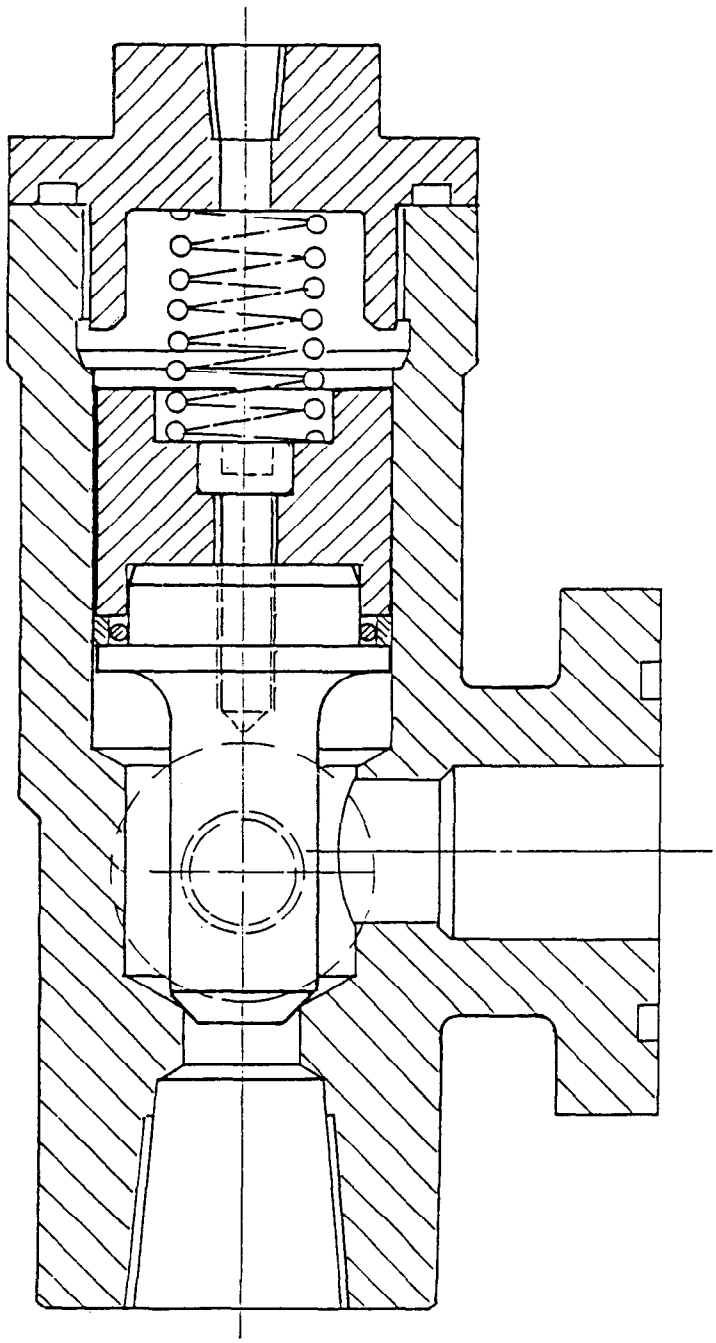
Batchen Model MkI LPG Meter

FIGURE 10/1/3B - 5



Batchen Model BVE-1 Vapour Eliminator

FIGURE 10/1/3B - 6



Batchen Model BDV-1 Differential Valve