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NATIONAL STANDARDS COMMISSION

WEIGHTS AND MEASURES (PATTERNS OF INSTRUMENTS) REGULATIONS

REGULATION 9

PROVISIONAL CERTIFICATE OF APPROVAL No P10/1/7

This is to certify that an approval has been granted by the Commission that the pattern of the

Indeng Model MK0 LPG Driveway Flowmeter

submitted by Industrial Engineering Limited
Gasplant Division
Ashley Street
WEST FOOTSCRAY VICTORIA 3012

is suitable for use for trade.

The approval is subject to review on or after 1/8/84.

Instruments purporting to comply with this approval shall be marked NSC No P10/1/7.

Relevant drawings and specifications are lodged with the Commission.

Conditions of Approval

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

2. Instruments installed under this approval are to be tested at six-monthly intervals after the initial verification test. Such tests are to be arranged by the submittor and supervised by the State Weights and Measures Authority; the results are to be sent to the Commission.

3. The Commission reserves the right to inspect and test any installation covered by this approval at any time without notice.

4. In the event of unsatisfactory performance, this approval may be modified or cancelled.

Signed
Executive Director

Descriptive Advice

Pattern: approved 16/6/83

. Indeng model MK0 attendant-operated driveway flowmeter for dispensing liquefied petroleum gas.

Technical Schedule No P10/1/7 dated 8/7/83 describes the pattern.

Filing Advice

The documentation for this approval comprises:

Certificate of Approval No P10/1/7 dated 8/7/83
Technical Schedule No P10/1/7 dated 8/7/83
Test Procedure No P10/1/7 dated 8/7/83
Figures 1 to 7 dated 8/7/83.

8/7/83

NATIONAL STANDARDS COMMISSION

TECHNICAL SCHEDULE No P10/1/7

Pattern: Indeng Model MK0 LPG Driveway Flowmeter

Submittor: Industrial Engineering Limited
Gasplant Division
Ashley Street
WEST FOOTSCRAY VICTORIA 3012

1. Description of Pattern

The pattern is an Indeng model MK0 driveway flowmeter (Figures 1 and 2) for the delivery of liquefied petroleum gas of density 0.500 to 0.515 kg/L at 15°C, at temperatures between 0°C and 45°C. The maximum and minimum flow rates are 80 L/min and 15 L/min respectively.

The hydraulic diagram for the driveway flowmeter is shown in Figure 3.

Volume	999.99 L in 0.01 L increments
Unit price	99.9 c/L in 0.1c increments
Price	$399.99 in 1c increments
Totaliser volume	9999999 L in 1 L increments

1.1 Component Structure and Conditions for Installation*

The component parts of each driveway flowmeter are listed in Figure 4 and comprise those components listed in (iii) to (xi) inclusive listed below.

(i) Supply tank

The supply tank is large enough to supply liquefied petroleum gas at a rate that does not cause the pressure in the supply tank to drop to the point where vapour production occurs in the line between the supply tank and the pump. The capacity of the supply tank is such that the maximum delivery of the driveway flowmeter in one minute is not greater than approximately 2.5% of the tank capacity.

The supply tank is located higher than the pump so that the liquid level always creates sufficient pressure at the pump inlet at maximum flow rate (i.e. above the vapour pressure) to prevent vapour being formed.

(ii) Pump

The pump is positioned as close as possible to the supply tank, with short inlet connections, and having as few restrictions as possible. There are to 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 inlet line should, where possible, slope upwards towards the supply tank.

The external pump by-pass relief valve is installed in a line returning to the supply tank; this line should have no low spots which could trap liquid, and where possible should slope upwards towards the supply tank. The external by-pass setting is 100 to 140 kPa LOWER than the internal pump relief valve setting, where such a valve is fitted.

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* This approval relates to the metrological performance of the metering system; inspectors are advised that the system must comply with the requirements of other statutory authorities relating to safety, handling, storage and transportation of liquefied petroleum gas.

(iii) Meter

Neptune type 4D 32 mm liquefied petroleum gas meter. An internal by-pass allows a portion of the incoming liquid to pass to the temperature compensator without being included in the measurement. A pressure gauge is fitted at the bottom of the meter (Figures 2 and 3).

(iv) Gas purger

The meter is protected from the measurement of vapour by correct installation and by a Neptune 32 mm gas purger which incorporates an inlet non-return valve, with soft seat and internal hydrostatic relief valve, a strainer and a float chamber (Figure 5). The gas purger is vented through a non-return valve, via a vapour return line not less than 20 mm in diameter, to the vapour space in the supply tank. The vapour return line is constructed without low spots or traps which could prevent free flow of vapour in either direction.

A thermometer pocket is situated in the strainer cover (Figure 5).

(v) Temperature compensator

A Neptune type 1 style 22 temperature compensator is attached to the top of the meter (Figures 6 and 7). Liquid flowing through the internal meter by-pass flows into the chamber between the temperature compensator and the meter, along the temperature-sensing capsule in the space between the capsule and a surrounding shield, and returns through a pipe to the bottom of the gas purger.

The expansion and contraction of the temperature-sensing capsule with changes in temperature of the liquid are transmitted by means of a pin-and-lever system to a variable-ratio drive which changes the coupling ratio between the meter and the indicator so that the indicated volume is the equivalent volume at a temperature of 15°C. An adjustment screw fitted to the bottom of the lever permits calibration of the compensator.

A thermometer pocket is situated in the compensator cover.

(vi) Driveway flowmeter indicator

A Production Engineering model Retron 80 driveway flowmeter indicator is used. This electronic indicator is mounted in two parts; the digital display in the top housing of the driveway flowmeter and the computer in the main housing. The computer is driven through a gear assembly from the output shaft of the temperature compensator (Figure 2). The unit price change button and test button are located on the computer.

When the nozzle is removed from its hang-up the pump motor immediately starts. There is a delay of no more than 8 seconds before the displays on the indicator reset by displaying all 8's and then all 0's with only the unit price displayed. The nozzle may then be connected to the purchaser's tank. In this way the same conditions apply at the commencement of each delivery, i.e. with the delivery hose being pressurised so that only liquid exists in it. The registration on the totaliser also has the same 8 second delay.

(vii) Pressure differential valve

A Neptune 32 mm spring loaded diaphragm valve maintains pressure in the metering chamber to prevent the formation of vapour. A pressure-equalising pipe is connected from the differential valve through an integral excess-flow valve (which has no bleed hole) to the supply tank, through the vapour return line from the gas-purger vent (Figure 3). The differential valve is set at 100 kPa (i.e. 100 kPa above the vapour pressure).

(ix) Outlet piping

The pipe connection from the differential valve to the hose is fitted with an excess-flow valve and stop valve (Figure 3).

(viii) Vapour indicator

A sight glass is fitted in the outlet of the meter after the differential valve so that it may be seen if vapour is being metered (Figure 3).

(x) Hose

The dispenser is fitted with a hose (and dry-break coupling) complying with the SAA code for hoses in use with liquefied petroleum gases with a bore not exceeding 20 mm. A ball valve and a vent valve are provided prior to the dry-break coupling; in normal use the handle of the ball valve is removed and the stem capped so that the valve cannot be tampered with. Nozzle removal operates a spring loaded lever assembly which activates a microswitch in the Retron 80 and initiates the reset procedure referred to in (vi) above.

(xi) Nozzle

The nozzle used is either a REGO model A7197 DM or A7708L (with Gameco safety device).

(xii)

To facilitate pressure equalisation when the driveway flowmeter is being tested with a pressure prover, provision is made for a vapour line from the prover to the vapour space of the supply tank either directly or via a tee in the vapour return line from the gas purger using a 1 3/4" Acme male adaptor. This provison is sealed OFF when not in use. During a normal delivery there is no vapour return connection between the receiving container and the supply tank.

1.2 Markings

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

Manufacturers name or mark	
Year of manufacture	
Model number	
Serial number	
NSC approval number	NSC No P10/1/7
Maximum flow rate	80 L/min
Minimum flow rate	15 L/min
Liquid temperature range	0°C to 45°C
Density for which temperature compensator is set	.....kg/L
Maximum operating pressure in the form	.....kPa
Approved for LPG of density 0.500 to 0.515 kg/L only	

1.3 Sealing/Verification (Figure 2)

A stamping plug is provided for verification purposes. The mechanical calibrator is sealed as shown or by a similar method.

The additional sealing shown is not mandatory.

TEST PROCEDURE No P10/1/7

The following test procedure is to be followed at each six-monthly reverification 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 to ensure that there is still sufficient pressure at the inlet to the pump to avoid vapour being generated.

1. Visual Inspection

Visually inspect the complete installation to ensure that the pump, supply tank, dispenser and pipework are installed in accordance with the description given in the Technical Schedule. If the system is not installed correctly (e.g. if a restrictive valve or fitting is installed in the pipeline) vapour may be generated and will show in the sight glass when the purger does not eliminate all the vapour.

2. Meter Test With Temperature Compensator De-activated

Maximum Permissible Errors:

± 0.5% at normal flow rate

± 1.0% at minimum flow rate

(i) Carry out at least three runs into the prover at the normal flow rate at which the meter is used. Read the temperature and pressure at the meter and at the prover. Correct for the change in volume of the liquid due to any difference in pressure and temperature between the meter and the prover and for changes in the volume of the prover due to any difference in pressure and temperature from the reference temperature and pressure at which it was calibrated.

(ii) Repeat the above test at the minimum flow rate of the meter or 15 L/min, whichever is the greater.

(iii) During the test runs, note whether any vapour is showing in the sight glass.

3. Meter Test With Temperature Compensator Activated

Maximum Permissible Errors:

± (0.7% + 0.02% per °C difference from 15°C) at normal flow rate

± (1.2% + 0.02% per °C difference from 15°C) at minimum flow rate

(i) Carry out at least three runs into the prover at the normal flow rate. Read the temperature and pressure at the meter and at the prover. After correcting the prover volume reading to its calibration temperature and pressure, reduce the volume to its equivalent volume at 15°C using the temperature indicated at the meter and the appropriate table for the density of the liquid for which the meter temperature compensator is set.* Compare the calculated volume with the meter indicated volume.

(ii) Repeat the above test at the minimum flow rate of the meter or 15 L/min, whichever is the greater.

4. Computation Tests On Indicator

(i) Remove the nozzle from its hang-up. Check that there is a delay of not more than 8 seconds before the displays on the indicator reset by displaying all 8's and then all 0's with only the unit price displayed.

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* ASTM-IP Petroleum Measurement Table 54 - Volume Reduction to 15°C (Metric Edition).

(ii) Deliver an amount of LPG equivalent to, say, $1.00.

(iii) Press the test button once (on the computer). The total price indicator will indicate $1.01.

(iv) Continue the delivery to, say, $2.00.

(v) Return the nozzle to its hang-up. The total price display on the driveway flowmeter will blank indicating a price-computation error.

(vi) Try to start a new delivery. This should not be possible.

Note: The instrument is now in a computation error mode. To bring the instrument out of this mode turn the power to the driveway flowmeter off for at least one minute, after which the instrument will have reverted to its normal operation mode.

J B.

P10/1/7
8/7/86

NATIONAL STANDARDS COMMISSION

NOTIFICATION OF CHANGE

PROVISIONAL CERTIFICATE OF APPROVAL No P10/1/7

CHANGE No 1

The following changes are made to the approval documentation for the

Indeng Model MKO LPG Driveway Flowmeter

submitted by Industrial Engineering Limited
Gasplant Division
Ashley Street
West Footscray Vic 3012.

In Test Procedure No P10/1/7 dated 8/7/83:

a) Delete references to Maximum Permissible Errors in clauses 2 and 3.

b) Insert the following before clause 1;

The maximum permissible error applied during a verification test from normal flow rate to the minimum flow rate * specified in the Technical Schedule is:

± 1.0% with the temperature compensator deactivated

and ± (1.2% + 0.02% per °C difference from 15°C) with the temperature compensator activated.

* The minimum flow rate for driveway flowmeters is 15 L/min unless otherwise specified in the Technical Schedule.

Signed

Executive Director

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.

FIGURE P10/1/7 - 1

Indeng Model MKO LPG Driveway Flowmeter

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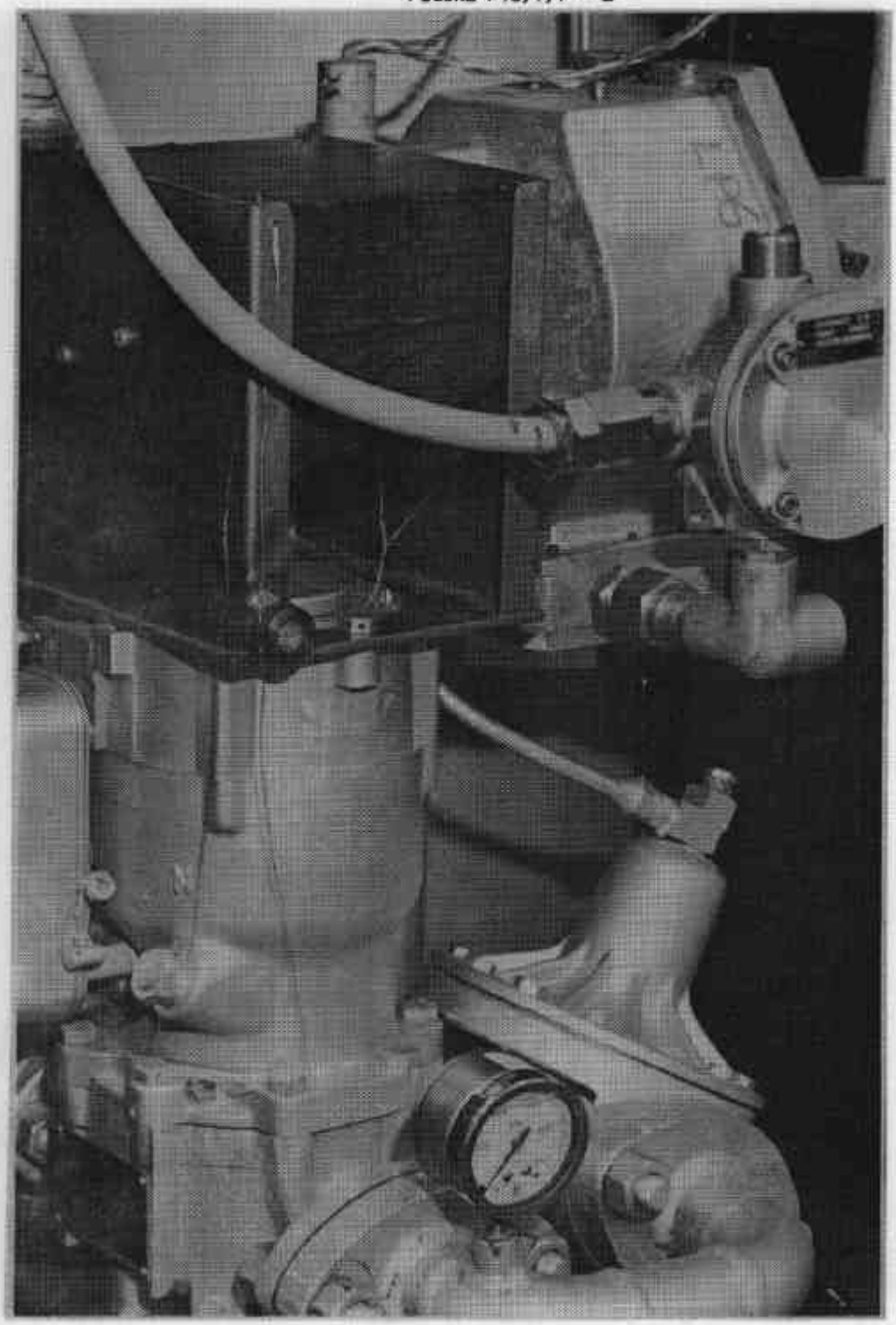
FIGURE P10/1/7 - 2



Showing Stamping Plug
And Sealing Of Mechanical Calibrator
(Gear Assembly Cover Plate Partly Cut Away)

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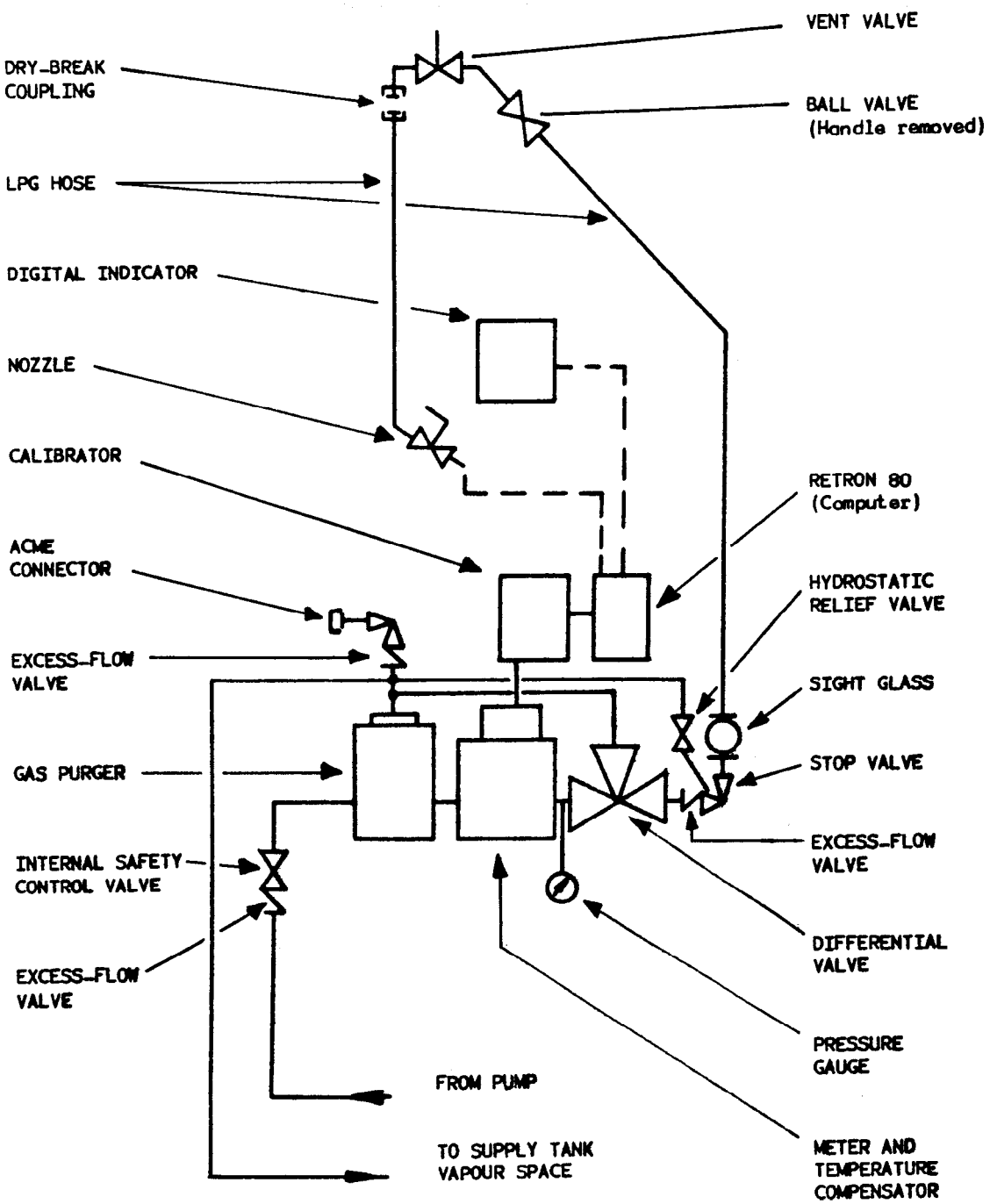
FIGURE P10/1/7 - 3



Hydraulic Diagram For Indeng MkO

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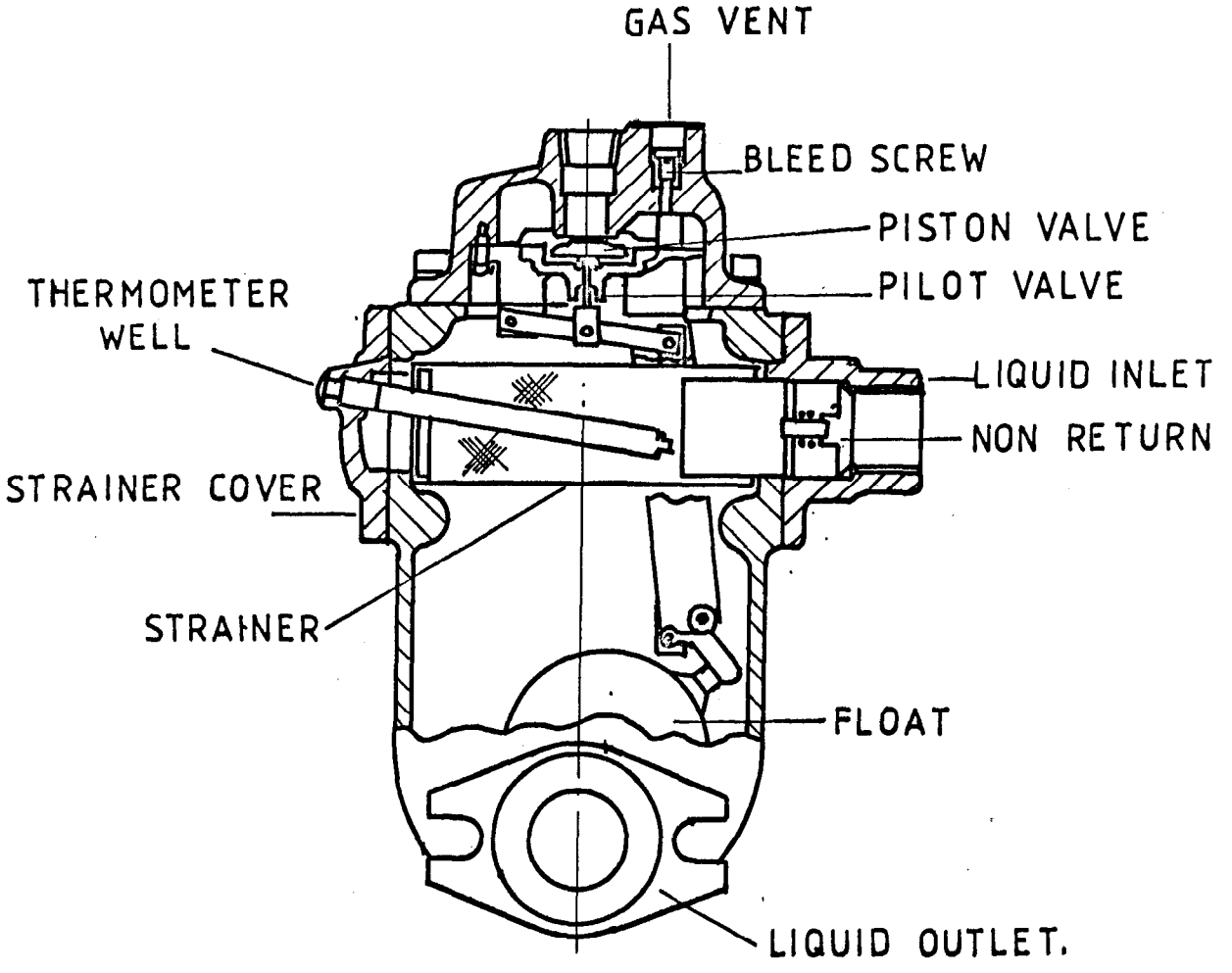
FIGURE P10/1/7 - 4

Meter:	Neptune 32 mm type 4D complete with gas purger, type 1 style 22 temperature compensator and differential valve
Computer:	Production Engineering model Retron 80
Nozzle:	REGO A7197 DM or A7708L (with Gameco safety device)
Excess Flow and Stop Valve:	20 mm in line - REGO 7550 PX, 36 GPM
Hydrostatic Relief Valve:	6 mm - ¼" NPT thread, G.P. 22009/100-150 or G.P. 22990/375-425
Vapour Indicator:	Hudson 20 mm sight glass flow indicator or equivalent
Delivery Hose:	Standard commercial hose approved for LPG, 20 mm nominal bore
Ball Valve:	Cast iron, steel or bronze construction - standard commercial product approved for LPG
Inlet Valve:	40 mm Internal Safety Control (ISC) valve - Fisher C208 with 50 GPM excess flow valve

Component Table For Indeng MK0

FIGURE P10/1/7 - 5



Gas Purger - Schematic Diagram

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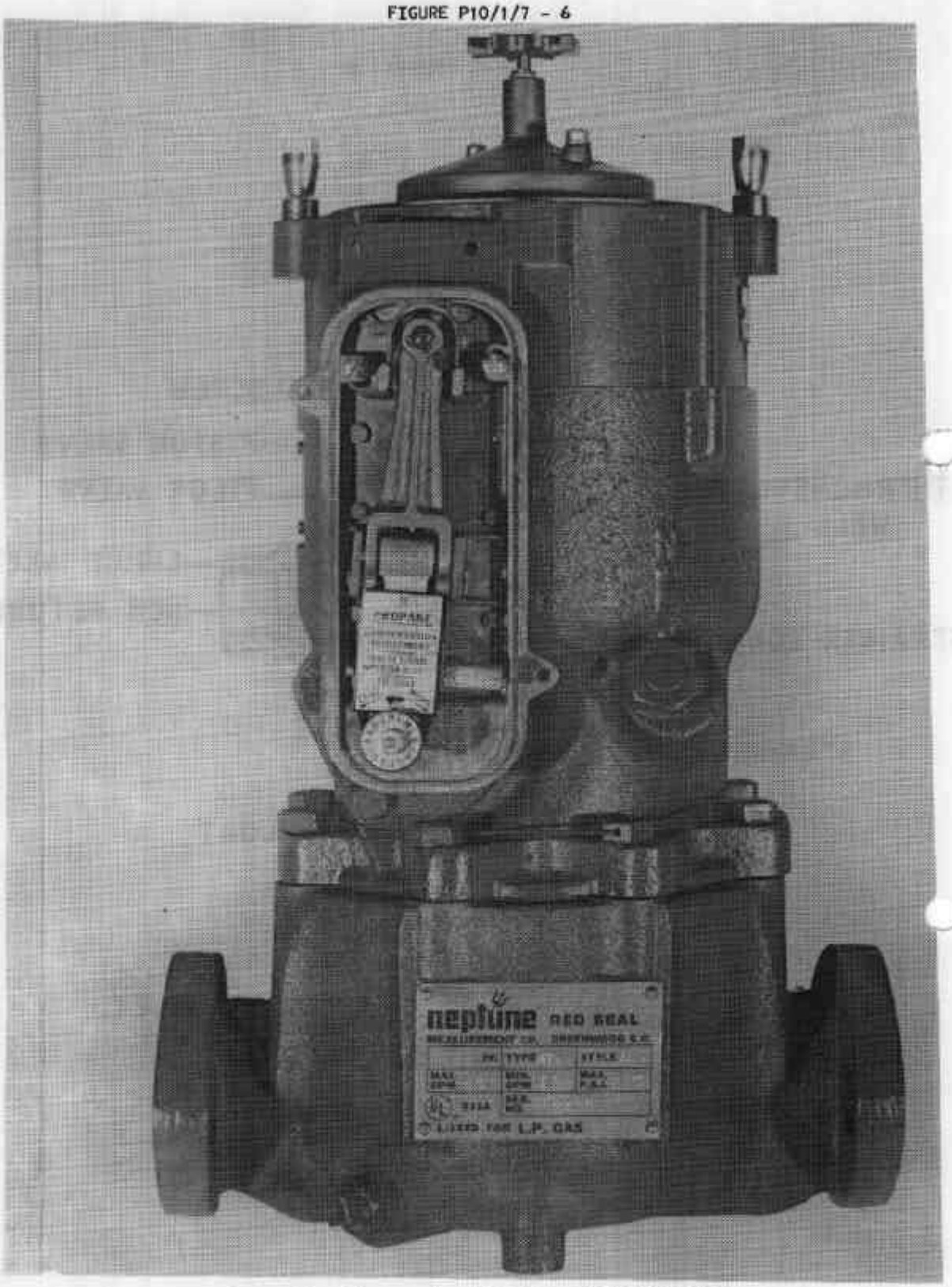
FIGURE P10/1/7 - 6



Temperature Compensator With Cover Of Calibration Adjuster Removed

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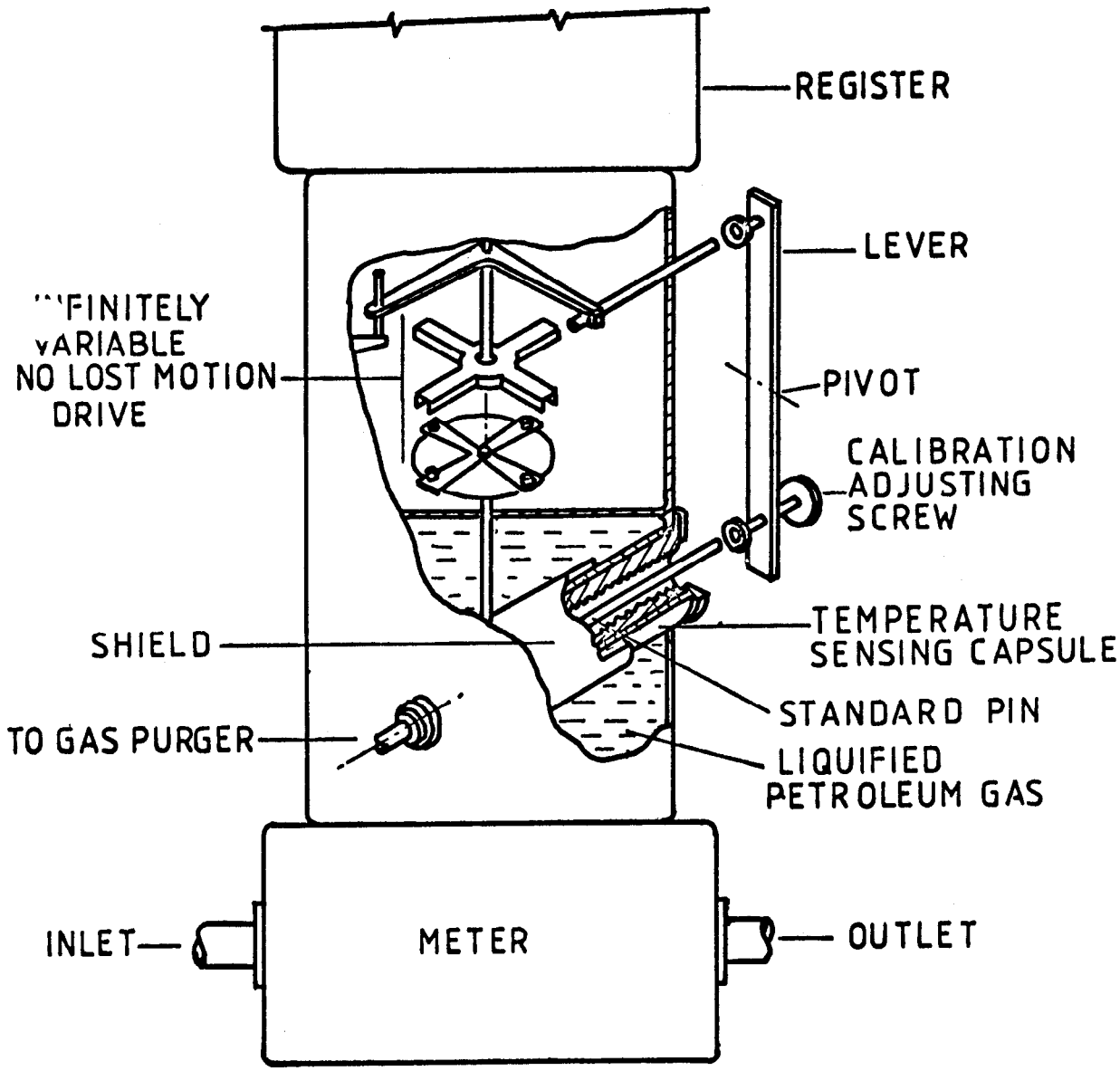
FIGURE P10/1/7 - 7



Temperature Compensator - Schematic Diagram

8/7/83