National Standards Commission

Cancellation

Certificate of Approval No 10/2/7

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

Smith Model S100 Mass Bulk LPG Flowmetering System

submitted by Diamond Key International Pty Limited
110 Henderson Road
Rowville VIC 3178

has been cancelled in respect of new instruments as from 31 August 1999.

Instruments which were verified/certified before that date may, with the concurrence of the relevant verifying authority, be submitted for reverification.

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

Certificate of Approval

No 10/2/7

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

Smith Model S100 Mass Bulk LPG Flowmetering System

submitted by Email Petroleum Systems
now of
33 Wedgewood Drive
Hallam VIC 3803.

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.

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CONDITIONS OF APPROVAL

This approval becomes subject to review on 1 September 1998, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No 10/2/7 and only by persons authorised by the submittor.

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.

Special: (for Variant 5)

The approval of variant 5 becomes subject to review on 1 July 1998.
The approval of variant 5 expires in respect of new instruments on 1 July 1999.

Instruments purporting to comply with variant 5 shall be marked NSC No P10/2/7 and only by persons authorised by the submittor.

Instruments purporting to comply with variant 5 are to be re-verified at six-monthly intervals. The submittor is to arrange such tests and is to send the results to the Commission.

In the event of unsatisfactory performance or of suitable test results not being received by the Commission, this approval may be withdrawn.

DESCRIPTIVE ADVICE

Pattern: approved 30 August 1993

- A Smith model S100 mass bulk flowmetering system for the delivery of liquefied petroleum gas.

Variant: approved 30 August 1993

1. With a model S50 mass flowmeter.

Variants: provisionally approved 30 August 1993
approved 13 March 1996

2. With a model S200 mass flowmeter.

3. With a model S250 mass flowmeter.

Technical Schedule No 10/2/7 describes the pattern and variants 1 to 3.

Variant: approved 12 May 1997

4. With a Smith Micro-Pak model KMTM3 transmitter module.

Variant: provisionally approved 26 June 1997

5. With a Smith model S100 mass meter installed in the vapour return line.

Technical Schedule No 10/2/7 Variation No 1 describes variants 4 and 5.

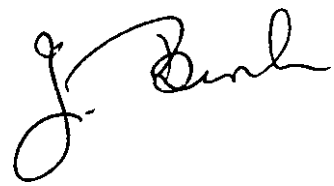
FILING ADVICE

Certificate of Approval No 10/2/7 dated 21 November 1994 is superseded by this Certificate and may be destroyed.

The documentation for this approval now comprises:

Certificate of Approval No 10/2/7 dated 22 January 1998
Technical Schedule No 10/2/7 dated 21 November 1994 (incl. Test Procedure)
Technical Schedule No 10/2/7 Variation No 1 dated 22 January 1998
Figures 1 to 4 dated 21 November 1994
Figures 5 to 7 dated 22 January 1998

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 10/2/7

Pattern: Smith Model S100 Mass Bulk LPG Flowmetering System.

Submittor: Email Electronics
88-94 Canterbury Road
Kilsyth VIC 3167.

1. Description of Pattern

A Smith model S100 mass bulk flowmetering system for the delivery of liquefied petroleum gas of density between 0.500 and 0.600 kg/L at 15°C. The maximum and minimum flow rates are 125 kg/min and 25 kg/min respectively. The minimum quantity is 25 kg.

1.1 Flowmetering System Component Structure

A typical system is shown in Figure 1.

(i) Supply Tank

The supply tank is of adequate capacity to ensure that at maximum flow rate the pressure in the tank does not drop to the point where vapour occurs. A low-level detection device may be fitted.

(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) Gas Purger (Figure 2)

The meter is protected from the measurement of vapour by correct installation and by a Schlumberger (Neptune) or Liquid Controls 38 mm float-operated gas purger with integral strainer. A larger capacity gas purger may be used. A thermometer well is situated in the strainer cover.

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.

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(iv) Meter

A Smith model S100 flow sensor (Figure 3) determines flow by measuring the effects of Coriolis forces on a pair of S-shaped tubes, which are vibrated at their resonant frequency by electromagnetic drivers. Relative motion between the two tubes is detected by two reluctance type motion sensors located equidistant upstream and downstream of the centre of the tubes.

A Smith model SR remote electronic unit (Figure 4) supplies input power to the electromagnetic drivers and processes signals from motion sensors in the flow sensor, into digital and analogue outputs proportional to mass flow rate.

The flow sensor and the remote electronic unit form the mass flowmeter.

(v) Indicator

A Smith model Accuload flowmetering system controller (as described in the documentation of NSC approval No S178A) or any other compatible Commission-approved (rate/total/status) electronic flow indicator.

The indicator must display units of mass.

(vi) Pressure Differential Valve

A Schlumberger (Neptune) spring-loaded diaphragm, or Liquid Controls spring-loaded piston or spring-loaded diaphragm, or Smith pilot-operated spring-loaded diaphragm pressure differential valve maintains a pressure of at least 100 kPa above the vapour pressure at the meter to prevent the formation of vapour.

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

(vii) Outlet Piping/Transfer Device

The outlet pipe from the pressure differential valve has provision for a pressure gauge, and is fitted with a non-return valve and a control valve. A flow rate control valve may also be fitted.

If fitted with a delivery hose it shall comply with the SA code for hoses in use with liquefied petroleum gases. A shut-off device is fitted at the end of the hose.

The control valve/shut-off device shall be the transfer device for the measurement and there shall be no intermediate outlets between the meter and the transfer device.

1.2 Markings

Instruments are marked with the following data, together in the one location:

Manufacturer's name or mark	
Meter model	
Serial number	
NSC approval number	10/2/7
Maximum flow rate	..... kg/min
Minimum flow rate	..... kg/min
Approved for LPG density range	0.500 to 0.600 kg/L
Minimum quantity	..... kg
Maximum operating pressure	..... kPa

1.3 Sealing and Verification/Certification Provision

No sealing is required for the meter. If sealing of the indicator is required, it is described in the approval documentation for the indicator.

Provision is made for a verification/certification mark to be applied.

2. Description of Variants

2.1 Variant 1

With a Smith model S50 mass flow meter. The maximum and minimum flow rates are 66 kg/min and 13 kg/min respectively.

The minimum quantity is 13 kg.

2.2 Variant 2

With a Smith model S200 mass flow meter. The maximum and minimum flow rates are 1020 kg/min and 204 kg/min respectively.

The minimum quantity is 204 kg.

2.3 Variant 3

With a Smith model S250 mass flow meter. The maximum and minimum flow rates are 1633 kg/min and 327 kg/min respectively.

The minimum quantity is 327 kg.

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.

Instruments should be tested with the liquid with which they will be used and which is marked on the data plate.

Maximum Permissible Errors at Verification/Certification

The maximum permissible error applied during a verification test from normal flow rate to the minimum flow rate specified in the Certificate of Approval or Technical Schedule is ±1.0%

TECHNICAL SCHEDULE No 10/2/7

VARIATION No 1

Pattern: Smith Model S100 Mass Bulk LPG Flowmetering System.

Submittor: Email Petroleum Systems
33 Wedgewood Drive
Hallam VIC 3803.

1. Description of Variants

1.1 Variant 4

With a Smith Micro-Pak model KMTM3 transmitter module (Figure 5) and model KMBM galvanic barrier module (Figure 6), replacing the Smith model SR remote electronic unit of the pattern and performing the same functions. These modules are used with a supply voltage in the range of 10 – 30 VDC.

A Contrec model 405L indicator (as described in the documentation of NSC approval No S296) is used, or any other compatible Commission-approved (rate/totals/status) electronic flow indicator.

1.2 Variant 5

With a Smith model S100 mass meter installed in the vapour return line of the LPG mass flowmetering system (Figure 7) for the mass measurement of LPG vapour. When used with this variant, and only measuring vapour, the maximum and minimum flowrates are 35 kg/min and 5 kg/min respectively.

This variant is used in conjunction with the Smith Micro-Pak model KMTM3 transmitter module, model KMBM galvanic barrier module and a Commission-approved indicator, which are described in variant 4.

The LPG mass flowmetering system may also include a Commission-approved indicator/controller which displays and/or prints the gross liquid and vapour mass measured and the net mass of liquid delivered.

TEST PROCEDURE

For Variant 5

Maximum Permissible Error

The maximum permissible error applied during a verification/certification test for the difference between the measured mass of LPG vapour and the mass of vapour displayed by the indicator or indicator/controller is ±10%.

The instrument may be verified directly by weighing the mass of vapour before and after transfer of LPG vapour. Alternatively, a certified vapour flowmeter (such as an orifice plate meter) installed in series with the instrument may be used, in which case the volume of vapour metered shall be converted to mass by determining the density of LPG vapour at metering temperature.

If an indicator/controller is fitted which displays and/or prints the gross liquid and vapour mass measured and the net mass of liquid delivered, check that the mass of vapour displayed by the indicator/controller is transferred correctly to the indicator/controller and that any loading docket produced shows correctly the mass of liquid metered, the mass of vapour subtracted, and the calculated mass of LPG delivered.

National Standards Commission

NOTIFICATION OF CHANGE

CERTIFICATE OF APPROVAL No 10/2/7

CHANGE No 1

The following changes are made to the approval documentation for the

Smith Model S100 LPG Mass Flowmetering System

submitted by Email Electronics
88-94 Canterbury Road
Kilsyth VIC 3175.

The Provisional status of Variants 2 and 3 has now been removed and Certificate of Approval No 10/2/7 dated 21 November 1994 should be amended as follows:

1. The **Special Conditions of Approval** for Provisional Variants 2 and 3 should be deleted.

2. The **Descriptive Advice** for Variants 2 and 3 should be amended to read as follows:

"**Variants**: provisionally approved 30 August 1993
approved 13 March 1996"

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 10/2/7

Change No 2

The following change is made to the approval documentation for the

Smith Model S100 Mass Bulk LPG Flowmetering System

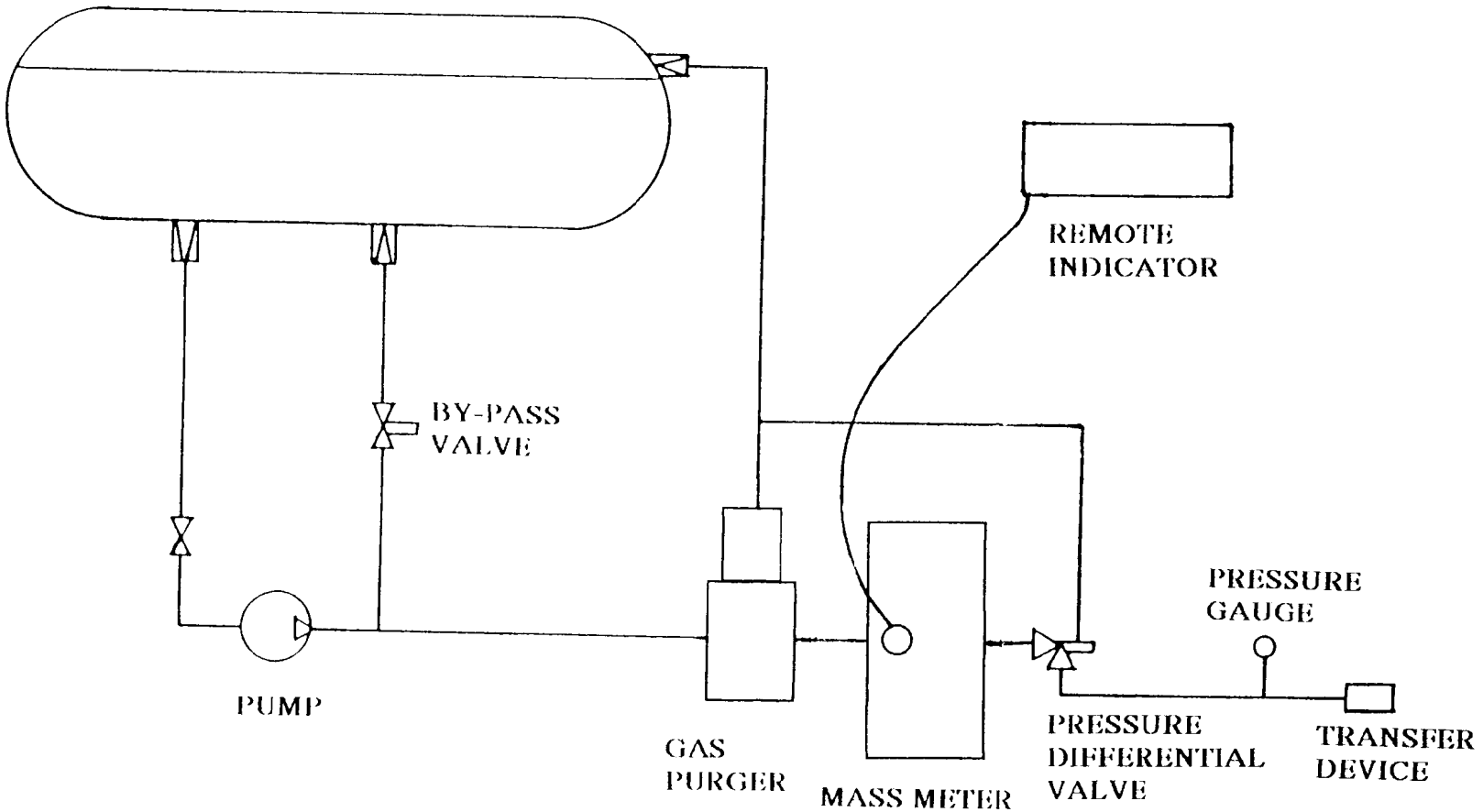
submitted by Email Petroleum Systems
now of
33 Wedgewood Drive
Hallam VIC 3137.

In Certificate of Approval No 10/2/7 and its Technical Schedule Variation No 1, both dated 22 January 1998, and in Technical Schedule No 10/2/7 dated 21 November 1994 and in Notification of Change No 1 dated 15 March 1996, all references to the submittor should be amended to read;

Diamond Key International Pty Limited
110 Henderson Road
Rowville VIC 3178.

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 10/2/7 - 1

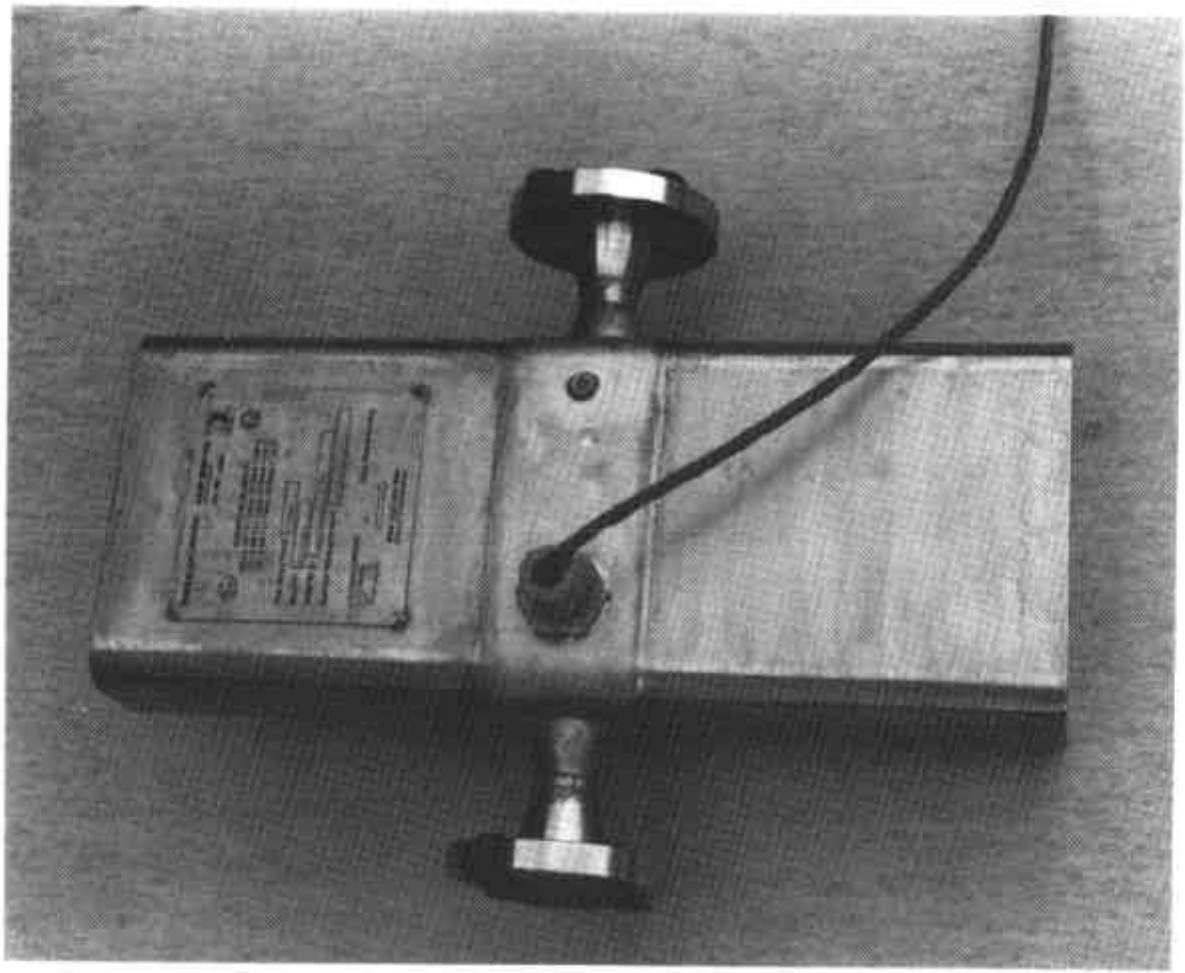


Typical Bulk LPG Flowmetering System

FIGURE 10/2/7 - 2

Liquid Controls Gas Purger

FIGURE 10/2/7 - 3



Smith Model S100 Mass Flow Sensor

FIGURE 10/2/7 - 4

Smith Model SR Remote Electronic Unit

FIGURE 10/2/7 - 5

Smith Micro-Pak Model KMTM3 Transmitter Module

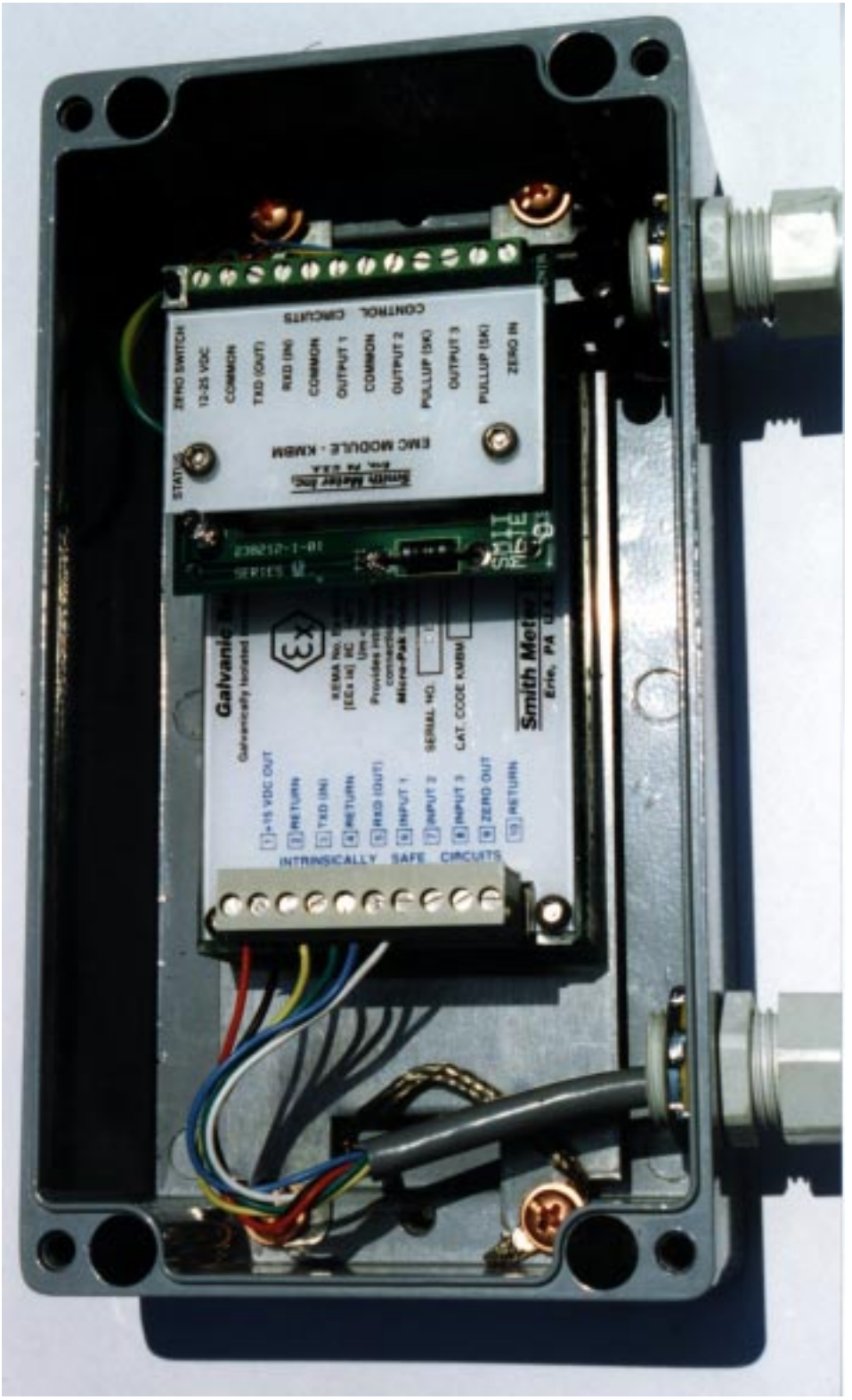


FIGURE 10/2/7 - 6

Smith Model KMBM Galvanic Barrier Module

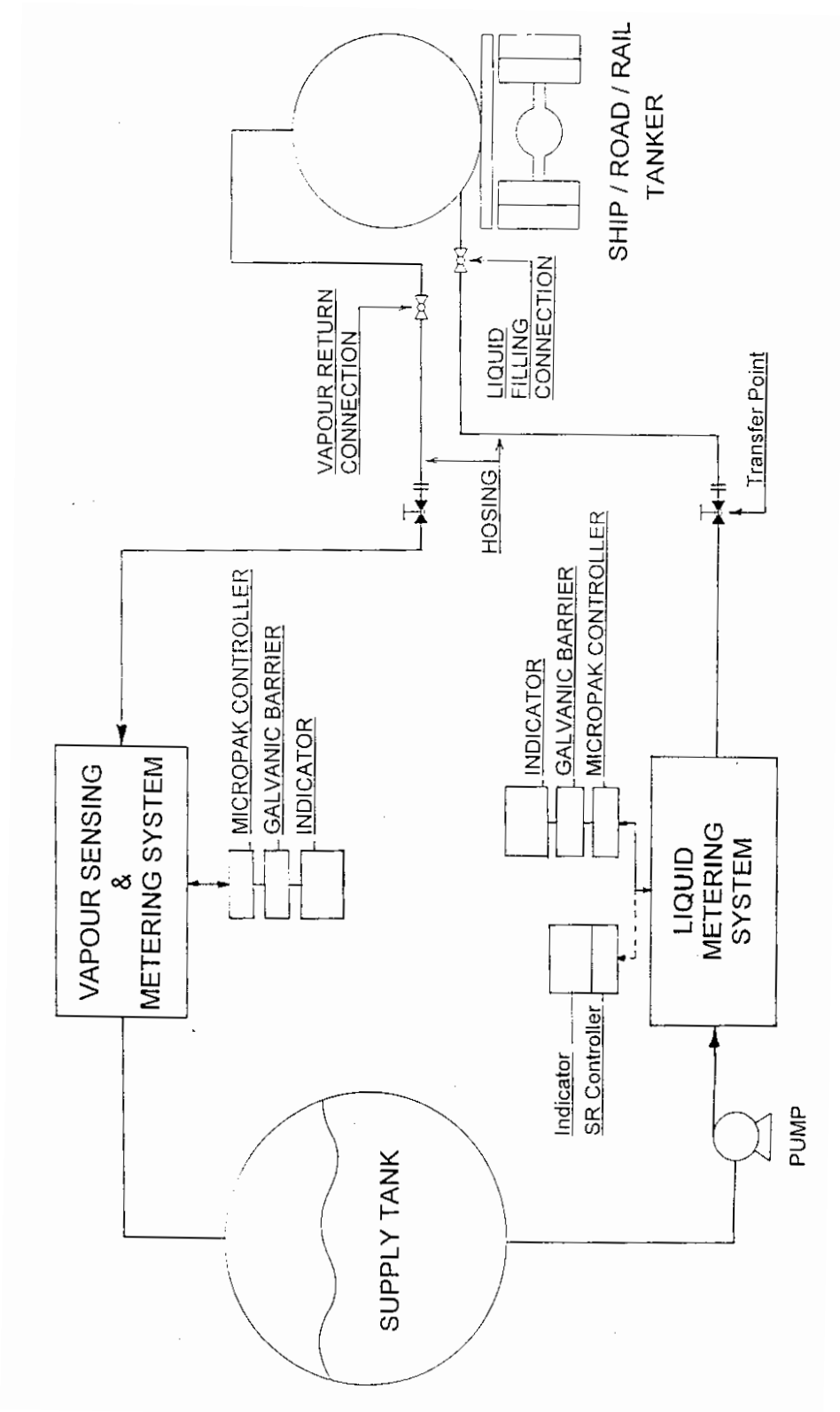


FIGURE 10/2/7 - 7

Typical Vapour Return System - Variant 5