

5/6B/99  
10 February 2005



**Australian Government**  

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**National Measurement  
Institute**

12 Lyonpark Road, North Ryde NSW 2113

**Notification of Change**  
**Certificate of Approval No 5/6B/99**  
**Change No 3**

Issued by the Chief Metrologist under Regulation 60  
of the  
National Measurement Regulations 1999

The following change is made to the approval documentation for the

S.A.M.P.I. Model M7 K. CI1 Liquid-measuring System

submitted by   Liquip Sales Pty Ltd  
                  13 Hume Road  
                  Smithfield   NSW   2164.

In all documentation for this approval, including Certificate of Approval No 5/6B/99 and its Technical Schedule Variation No 1 both dated 31 May 2004, and in the Technical Schedule dated 10 January 2000, all references to the submitter should be amended to read:

‘Liquip International Pty Limited’

The address remains unchanged.

Signed by a person authorised by the Chief Metrologist  
to exercise his powers under Regulation 60 of the  
National Measurement Regulations 1999.

A handwritten signature in black ink, appearing to be 'J. H. T.', is located in the bottom right corner of the page.



**Australian Government**  

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**National Measurement  
Institute**

12 Lyonpark Road, North Ryde NSW 2113

**Cancellation  
Certificate of  
Approval No 5/6B/99**

Issued by the Chief Metrologist under Regulation 60  
of the  
National Measurement Regulations 1999

This is to certify that the approval for use for trade granted in Certificate of Approval  
No 5/6B/99 issued 10 January 2000 in respect of the

S.A.M.P.I. Model M7 K. CI1 Liquid-measuring System

submitted by   Liquip Sales Pty Ltd  
                  13 Hume Road  
                  Smithfield     NSW     2164

has been cancelled in respect of new instruments as from 1 July 2005.

Signed by a person authorised by the Chief Metrologist  
to exercise his powers under Regulation 60 of the  
National Measurement Regulations 1999.

A handwritten signature in black ink, appearing to be the initials "JHT" with a long, sweeping tail that loops back up towards the "H".



# Australian Government

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## National Standards Commission

12 Lyonpark Road, North Ryde NSW 2113 Australia

### Certificate of Approval

**No 5/6B/99**

Issued under Regulation 60  
of the  
National Measurement Regulations 1999

This is to certify that an approval for use for trade has been granted in respect of the  
S.A.M.P.I. Model M7 K. CI1 Liquid-measuring System

submitted by   Liquip Sales Pty Ltd  
                  13 Hume Road  
                  Smithfield   NSW   2164.

**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 becomes subject to review on 1 September 2004, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked NSC No 5/6B/99 and only by persons authorised by the submitter.

It is the submitter'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 NSC P 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 26 September 2003

- A S.A.M.P.I. model M7 K. C11 liquid-measuring system which is approved for accuracy class 0.5 for liquids other than water having a kinematic viscosity between 0.5 and 12.5 mm<sup>2</sup>/s

**Variants:** approved 10 August 1999

1. Using certain other S.A.M.P.I. meters as listed in Table 1.
2. As a mobile liquid-measuring system.
3. As a drum-filling liquid-measuring system.

Technical Schedule No 5/6B/99 describes the pattern and variants 1 to 3.

**Variant:** approved 18 May 2004

4. Mobile liquid-measuring systems with a control valve before the hose reel.

Technical Schedule No 5/6B/99 Variation No 1 describes variant 4.

### FILING ADVICE

Certificate of Approval No 5/6B/99 dated 10 January 2000 is superseded by this Certificate, and may be destroyed. The documentation for this approval now comprises:

Certificate of Approval No 5/6B/99 dated 31 May 2004

Technical Schedule No 5/6B/99 dated 10 January 2000 (incl. Table 1 & Test Procedure)

Technical Schedule No 5/6B/99 Variation No 1 dated 31 May 2004

Figures 1 to 5 dated 10 January 2000

Figure 6 dated 31 May 2004



## TECHNICAL SCHEDULE No 5/6B/99

**Pattern:** S.A.M.P.I. Model M7 K. C11 Liquid-measuring System.

**Submittor:** Liquip Sales Pty Ltd  
13 Hume Road  
Smithfield NSW 2164

### 1. Description of Pattern

A liquid-measuring system using a S.A.M.P.I. model M7 K. C11 positive displacement meter (Table 1) which is approved for accuracy class 0.5 for liquids other than water, having a kinematic viscosity between 0.5 and 12.5 mm<sup>2</sup>/s and stored at atmospheric pressure. The meter is adjusted to be correct for the liquid for which it is to be verified/certified.

The system is approved for maximum and minimum flow rates of 500 and 50 L/min, respectively. The minimum measured quantity (MMQ) is 100 litres.

#### 1.1 Truck-loading Liquid-measuring System (Figure 1)

##### (i) Tank

The supply tank may be situated either above or below ground.

##### (ii) Pump

The pump is fitted in a positive suction head (flooded suction) installation, i.e. below the liquid level in the supply tank (Figure 1).

Positive displacement type, centrifugal type, or submersible turbine type pumps may be used. Systems which incorporate submersible turbine type pumps, may in addition include centrifugal type pumps fitted above the liquid level in the supply tank as supplementary pumps.

If the pump is not for the exclusive use of the meter, the flow rate through the meter must stay within the appropriate flow rate range for all combinations of alternative uses of the pump.

##### (iii) Non-return Valve

A non-return valve is fitted between the pump and the meter, or the components and piping are arranged to prevent reverse flow of the liquid and to keep the system full of liquid at all times.

#### **(iv) Gas Elimination Device**

A S.A.M.P.I. model 42100 gas elimination/strainer assembly is fitted as close as practicable to the meter inlet. The gas elimination device is approved on the condition that the pump is operated under a positive suction head.

The gas elimination/strainer assembly may be modified for use as a strainer only where the tank has automatic alarming of low-liquid level, or has a float-operated shut-off valve to prevent gas entering the system.

#### **(v) Meter**

A S.A.M.P.I. model M7 K. CI1 positive displacement meter (Figure 2) is used.

The meter consists of a housing in which two displacement rotors and a blocking rotor turn in a synchronised relationship. Each rotor is supported on either end by a bearing plate through which the shafts protrude.

At one end of each rotor shaft is a timing gear. The blocking rotor gear has twice the number of teeth of each of the displacement rotor gears and rotates at half their revolutions.

Provision is made for fitting a pressure gauge downstream of the meter.

#### **(vi) Calibration Device**

The calibration of the meter is performed using the adjustment device located directly behind the sealable S.A.M.P.I. emblem faceplate. The calibration device provides a variable transmission between the meter element and the indicator so that the drive between the meter and indicator can be varied until the meter throughput corresponds to the volume shown by the indicator. The adjustment device is graduated in divisions of 1%, 0.1% and 0.02%

#### **(vii) Indicating System**

Any of the following assemblies may be used:

- (a) A Veeder-Root 7886 or 7887 series zero-start indicator (Figure 3a) driven by the calibration device; or
- (b) A Veeder-Root 7890 series zero-start indicator with a model 788811-001 accumulative ticket printer or a model 788810-001 zero-start ticket printer mounted on top of the indicator; or

- (c) Either (a) or (b) with a pre-set device incorporating a Veeder-Root 7889 series pre-set counter (Figure 3b), fitted between the calibration device and the indicator.

The pre-set device serves to deliver a pre-set volume of liquid by means of a S.A.M.P.I. model V7 pre-set control valve. The required quantity is displayed on the pre-set counter and is set by using five push-buttons. The maximum pre-set volume is 99999 units of measurement. During the metering operation the display of the pre-set counter progressively returns to zero. A mechanical linkage within the pre-set device closes the pre-set valve in two stages to complete the delivery. The pre-set control valve, which may also be manually operated, is installed downstream of the meter.

The unit of measurement marked on the pre-set counter is the same as on the zero-start indicator.

The pre-set counter is marked PRE-SET INDICATION NOT IN USE FOR TRADE.

- (d) A rigid extension drive from the meter to the indicator, pre-set counter and ticket printer, and/or a 90° indicator stack adaptor may also be used.

### **(viii) Transfer Device**

The transfer device is one of the following:

- (i) Top-loading arrangement - the highest point of the pipework forms a weir at a fixed level from which the delivery pipe drains to the outlet for all configurations of the hose or loading arm whilst in operation. A syphon breaker is installed to ensure complete draining of the pipework downstream of the weir.

Alternatively, an anti-drain valve which retains a pressure of not less than 55 kPa may be installed at the delivery point of the pipework or hose; or

- (ii) Bottom-loading arrangement - a dry-break coupling located at the delivery point of the pipework or hose.

## **1.2 Verification/Certification Provision**

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

### 1.3 Markings and Notices

Each measuring system shall bear the following information, placed together either on the indicating device or on a data plate:

Pattern approval mark	NSC No 5/6B/99
Manufacturer's identification mark or trade mark	.....
Meter model	.....
Serial number of the instrument	.....
Year of manufacture	.....
Accuracy class	0.5
Maximum flow rate ( $Q_{max}$ )	..... L/min
Minimum flow rate ( $Q_{min}$ )	..... L/min
Minimum measured quantity (MMQ)	..... L
Maximum pressure ( $P_{max}$ )	..... kPa
Cyclic volume	..... L/rev
Type of liquid for which the system is verified (*)	.....

Notices as specified elsewhere in this Technical Schedule.

(\*) This may be located separately, e.g. on a metal tag sealed to the instrument.

### 1.4 Sealing Provision

Provision is made for sealing the following components:

- (a) The covers of the meter housing;
- (b) The calibrating mechanism;
- (c) The indicating mechanism and pre-set mechanism, if fitted; and
- (d) At least one of the vent pipes from the gas eliminator to prevent it from being closed or obstructed in any way.

## 2. Description of Variants

### 2.1 Variant 1

Using certain other S.A.M.P.I. meters as listed in Table 1.



**TABLE 1**

<b>Meter Model (*)</b>	<b>Cyclic Volume (L/rev)</b>	<b>Flow Rate (L/min)</b>		<b>Minimum Measured Quantity MMQ (L)</b>	<b>Pre-set Valve Model (#)</b>
		<b>Q<sub>min</sub></b>	<b>Q<sub>max</sub></b>		
M5	0.309	25	250	50	V7
M7	0.681	50	500	100	V7
M10	0.681	55	550	100	V10
M15	1.839	100	1000	100	V15
M25	1.839	115	1150	100	V25
M30	5.101	170	1700	200	V30

(\*) Note that the meter models listed are basic model numbers only – the full model numbers may have a variety of additional alphanumeric characters, e.g. M15 CX. C11, where:

‘M’ designates meter.

‘15’ designates the capacity of the meter; other capacities are listed in Table 1.

‘C’ designates accessory combinations fitted to the meter, e.g. pre-set valve, gas eliminator, strainer, printer; may be any character ‘A’ to ‘N’.

‘X’ designates that an air check valve is fitted; if ‘blank’ no air check valve fitted.

‘C11’ designates the class of the meter in respect of the materials and its application, i.e. CL1 is class 1 used for standard petroleum products; may be any number ‘1’ to ‘20’.

(#) Model of the pre-set operated control valve used, when the meter is fitted with a pre-setting facility.

## 2.2 Variant 2

As a mobile liquid-measuring system (excluding for aircraft refuelling) as shown in Figure 4 and which includes the following:

- S.A.M.P.I. models M5, M7, and M10 meters fitted with a gas elimination device consisting of a S.A.M.P.I. model 42100 gas eliminator/strainer and a S.A.M.P.I. model X-7 air or gas-activated check valve; or
- S.A.M.P.I. models M15, and M25 meters fitted with a gas elimination device consisting of a S.A.M.P.I. model 42100 gas eliminator/strainer and a S.A.M.P.I. model X-15 air or gas-activated check valve.

The air or gas-activated check valve is connected by means of a rigid bleed line to one of two vent ports at the top of the gas eliminator. Both ports are fitted with reed valves. When air or gas is present, the gas eliminator float drops and opens the reed valves, expelling air or gas through the vent port. Air or gas pressure acting on the check valve causes the valve to close; this prevents flow through the meter. Once the valve is closed the air or gas is vented to the vapour space in the supply tank or atmosphere, through the second port of the gas eliminator. As air or gas is expelled the gas eliminator fills up with liquid; the float rises and closes the reed valves. As the pressure on the check valve is relieved, the valve opens allowing flow of liquid through the meter.

The system may comprise the pump, together with a pressure control valve (if necessary), and a flexible hose and hose reel. In this case, the transfer device is in the form of either a nozzle or a dry-break coupling at the end of the hose.

The pump is fitted in a positive suction head (flooded suction) installation, i.e. below the liquid level in the supply tank. A non-return valve is located between the pump and the meter, or the components and piping are arranged to keep the system full of liquid at all times.

Any nozzle used shall have an integral outlet control valve. If the nozzle is fitted with an integral anti-drain valve, the valve shall be immediately before the outlet control valve or a separate anti-drain valve may be fitted to the nozzle end of the hose. The anti-drain valve retaining pressure shall be not less than 55 kPa.

### 2.3 Variant 3

As a drum-filling liquid-measuring system (Figure 5) which includes the following:

- A S.A.M.P.I. model M-5 or M-7 meter as listed in Table 1.
- A S.A.M.P.I. model 42100 gas eliminator/strainer assembly.
- A S.A.M.P.I. V7 pre-set control valve.
- A Veeder-Root 7889 series pre-set counter.
- A Veeder-Root 7890 series zero start indicator with a model 788811-011 accumulative ticket printer or a model 788810-001 zero start ticket printer.
- A transfer device in the form of an outlet control valve, with integral anti-drain valve. The valve may be closed manually or by the pre-set counter.

The pre-set mechanism is approved to repeat fixed deliveries of either 60, 200 or 205 litres and is marked PRE-SET FOR BATCHES '# LITRES or BATCHES '# LITRES (where '#' equals one of the approved pre-set quantities).

The pre-set counter of this variant shall be sealed to prevent unauthorised adjustment or dismantling and need NOT be marked PRE-SET INDICATION NOT IN USE FOR TRADE.

The system is arranged such that the meter operates at a constant flow rate ( $\pm 5\%$  of nominal) within the maximum and minimum flow rate range specified in Table 1.

The outlet is either a drum-filling spear or a hose. If a spear is used, it is arranged to fully drain after each delivery so that the control valve is the transfer device. If a hose is used, it is fitted with a nozzle which has an anti-drain valve installed either in the nozzle or immediately before it, and having a retaining pressure of not less than 55 kPa; the nozzle is the transfer device.

#### TEST PROCEDURE

Instruments should be tested in accordance with any relevant tests specified in the Inspector's Handbook using the type of liquid with which they will be used and which is marked on the instrument. Tests should be conducted in conjunction with any tests specified in the approval documentation for any indicator/controller and/or any conversion device, etc. used.

## **Maximum Permissible Errors**

### **For accuracy class 0.5:**

The maximum permissible errors applicable are:

±0.3% for calibration of the meter; and

±0.5% for verification/certification of the measuring system.

## **Hose Dilation Test**

The maximum permissible errors applicable for hose dilation are:

±(0.01 x Minimum Measured Quantity) litres for systems without a hose reel;  
and

±(0.02 x Minimum Measured Quantity) litres for systems with a hose reel.

## **Elimination of Air or Gas**

The maximum permissible errors applicable for the elimination of air or gas are:

±0.5% for liquids having a dynamic viscosity not exceeding 1 mPa.s  
(e.g. petrol); and

±1% for liquids having a dynamic viscosity exceeding 1 mPa.s  
(e.g. kerosene).

TECHNICAL SCHEDULE No 5/6B/99

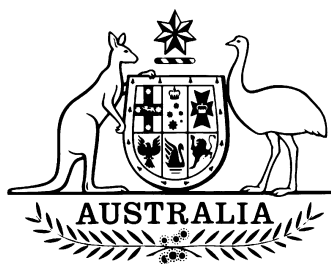
VARIATION No 1

**Pattern:** S.A.M.P.I. Model M7 K. C11 Liquid-measuring System

**Submittor:** Liquip Sales Pty Ltd  
13 Hume Road  
Smithfield NSW 2164

**1. Description of Variant 4**

Mobile liquid-measuring systems (variant 2) with a ball valve located between the check valve and the hose reel (Figure 6) to provide flow rate control. The ball valve is fitted with location devices to prevent flow rates outside the approved flow rate range ( $Q_{\min}$  to  $Q_{\max}$ ) of the meter.



## National Standards Commission

12 Lyonpark Road, North Ryde NSW

### Notification of Change

### Certificate of Approval No 5/6B/99

### Change No 1

The following changes are made to the approval documentation for the

S.A.M.P.I. Model M7 K. CI1 Liquid-measuring System

submitted by   Liquip Sales Pty Ltd  
                  13 Hume Road  
                  Smithfield   NSW   2164.

- A.   In Certificate of Approval No 5/6B/99 dated 10 January 2000, the following sentence should be added to the DESCRIPTIVE ADVICE for the pattern:

“The meter may also be known as a model SM7 K. CI1.”

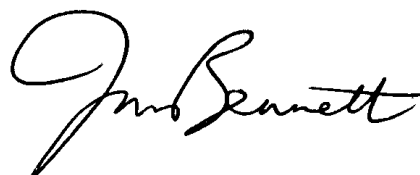
- B.   In Technical Schedule No 5/6B/99 dated 10 January 2000, the following sentence should be added to clause **1. Description of Pattern** and to clause **1.1(v) Meter**:

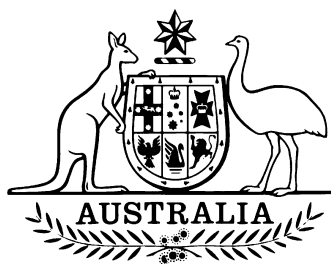
“The meter may also be known as a model SM7 K. CI1.”

- C.   In Technical Schedule No 5/6B/99 dated 10 January 2000, the reference “M designates meter” in the footnote below Table 1 should be amended to read:

“M’       designates meter. May also be marked as ‘SM’.”

Signed by a person authorised under Regulation 63 of the National Measurement Regulations 1999 to exercise the powers and functions of the Commission under this Regulation.





## National Standards Commission

12 Lyonpark Road, North Ryde NSW

### Notification of Change

### Certificate of Approval No 5/6B/99

### Change No 2

The following changes are made to the approval documentation for the

S.A.M.P.I. Model M7 K. CI1 Liquid-measuring System

submitted by   Liquip Sales Pty Ltd  
                  13 Hume Road  
                  Smithfield   NSW   2164.

In Technical Schedule No 5/6B/99 dated 10 January 2000:

- A.   The following footnote should be added to clause **1.1 Truck-loading Liquid-measuring System** subclause **(vii) Indicating System**;

“Note:   Approved printers are fitted with the internal right-hand wheel for printing the unit of measurement.”

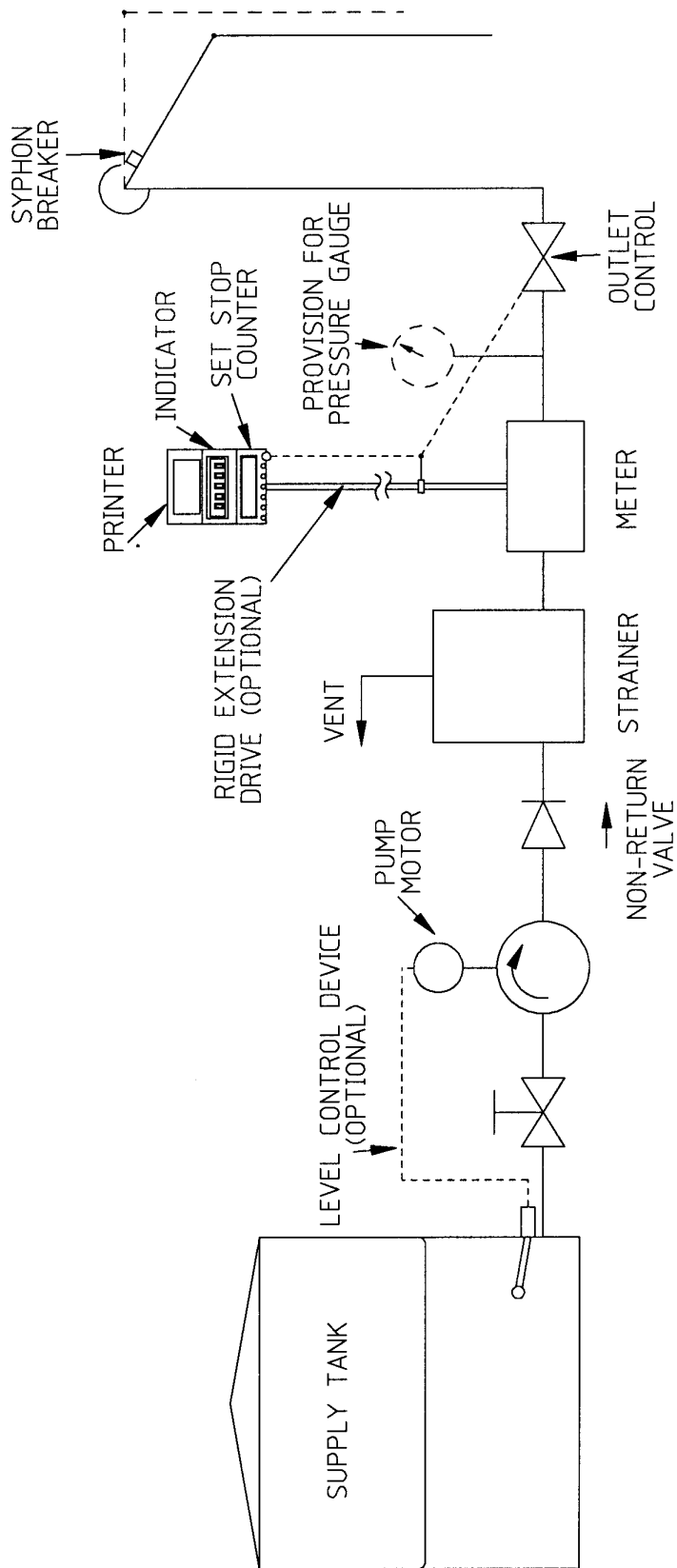
- C.   In clause **2.3 Variant 3**, the 5th bullet point should be amended to remove the reference to printers, so that it now reads:

“   A Veeder Root 7890 series zero-start indicator.”

Signed by a person authorised under Regulation 63 of the National Measurement Regulations 1999 to exercise the powers and functions of the Commission under this Regulation.

A handwritten signature in black ink, appearing to read 'Jim Bennett'. The signature is written in a cursive style with a large initial 'J'.

FIGURE 5/6B/99 - 1



Typical Truck-loading Liquid-measuring System



FIGURE 5/6B/99 - 2

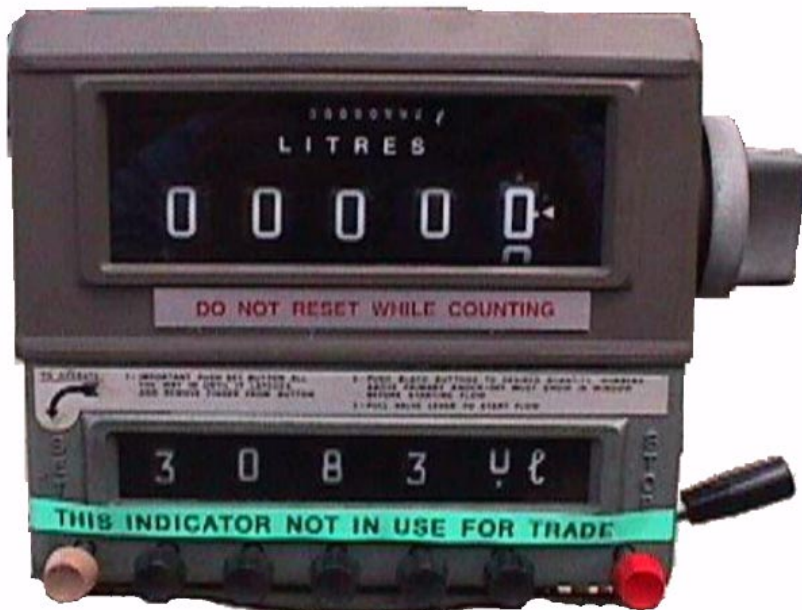


S.A.M.P.I. Model M7 K. C11 Meter

FIGURE 5/6B/99 - 3

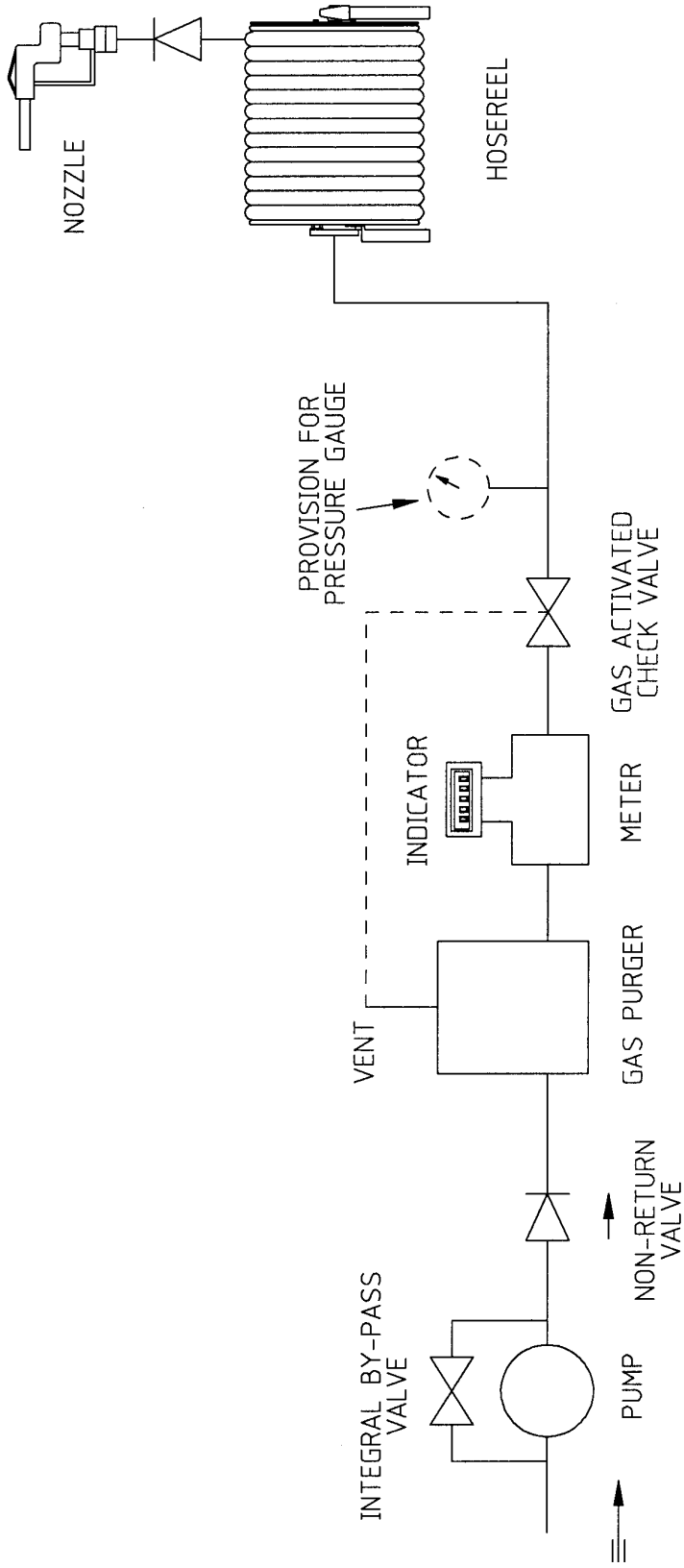


(a) Veeder-Root Indicator



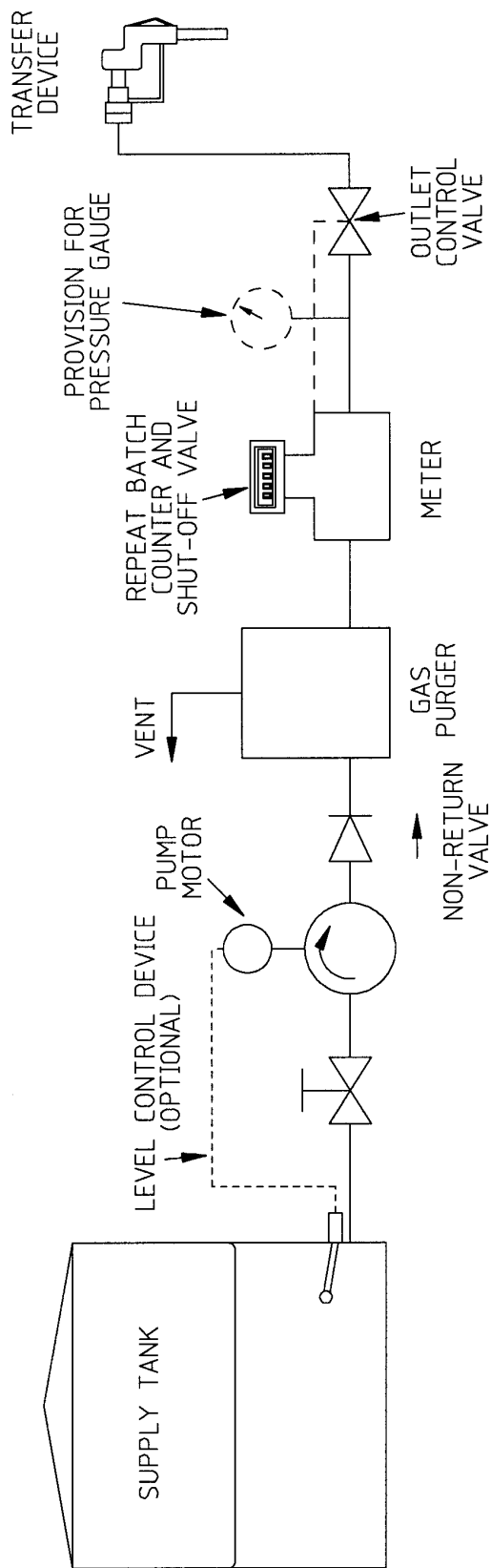
(b) Veeder-Root Indicator and Pre-set Counter

FIGURE 5/6B/99 - 4



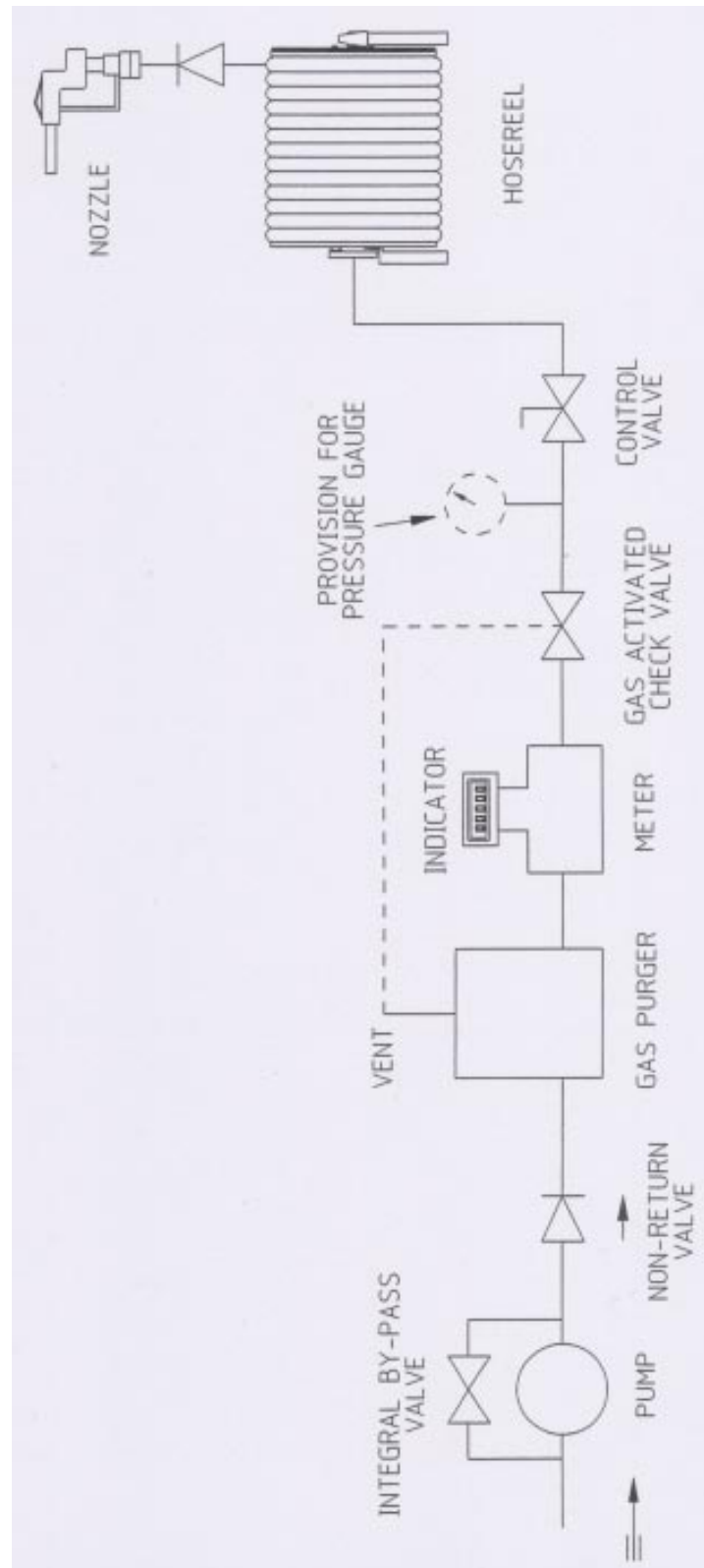
Typical Mobile Liquid-measuring System

FIGURE 5/6B/99 - 5



Typical Drum-filling Liquid-measuring System

FIGURE 5/6B/99 – 6



Typical Mobile Liquid-measuring System With Control Valve Before The Hose Reel