Australian Government
Department of Industry, Science and Resources

National Measurement Institute

36 Bradfield Road, West Lindfield NSW 2070

Certificate of Approval

NMI 5/6A/230

Issued by the Chief Metrologist 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 instruments herein described.

Gilbarco Model Frontier (Electroline Mk5) T960A1NP Fuel Dispenser for Motor Vehicles

submitted by Gilbarco Australia Limited
20 Highgate Street
AUBURN NSW 2144

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 approval has been granted with reference to document NMI R 117-1, Measuring Systems for Liquids Other than Water, dated June 2011.

This approval is subject to review at the decision of the Chief Metrologist in accordance with the conditions specified in the document NMI P 106.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variants 1 to 11 approved – certificate issued	25/10/13
1	Variant 12 approved – certificate issued	22/04/14
2	Variant 13 approved – certificate issued	4/11/15
3	Variant 1 (Table 1) amended – variant 14 approved – certificate issued	25/02/16

Document History (cont…)

Rev	Reason/Details	Date
4	Variants 15 & 16 approved – certificate issued	01/03/17
5	Variant 17 approved – certificate issued	27/06/17
6	Variant 1 (added Model Q) and Figure 11 amended – certificate issued	21/06/19
7	Variant 15 amended Hose Configuration included – certificate issued	28/02/20
8	Variant 18 provisionally approved – certificate issued	27/09/22
9	Variant 18 approved – certificate issued	13/12/22

CONDITIONS OF APPROVAL

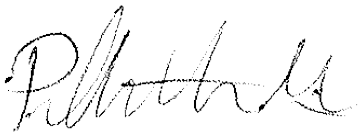
General

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 5/6A/230' 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 National Measurement Institute (NMI) 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 document NMI P 106.

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

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



Phillip Mitchell
A/g Manager
Policy and Regulatory Services

TECHNICAL SCHEDULE No 5/6A/230

1. Description of Pattern approved on 25/10/13

A Gilbarco model Frontier (Electroline Mk5) T960A1NP fuel dispenser for motor vehicles is approved to dispense various grades of fuels (*), in attendant-operated mode, or in unattended self-service mode using any compatible (#) approved control console. The meter is adjusted to be correct for the liquid for which it is to be verified.

(*) including up to 10% ethanol (E10) and various grades of pure biodiesel and biodiesel/distillate blends (to Australian government standard).

(#) 'Compatible' is defined to mean that no additions/changes to hardware/software are required for satisfactory operation of the complete system.

1.1 Field of Operation

The field of operation of the measuring system is determined by the following characteristics:

• Minimum measured quantity, V_{min}	2 L	
• Maximum flow rate, Q_{max}	50 L/min	
• Minimum flow rate, Q_{min}	5 L/min	
• Maximum pressure of the liquid, P_{max}	350 kPa	
• Minimum pressure of the liquid, P_{min}	140 kPa	(#1)
• Range of liquids viscosity	0.5 to 20 mPa.s (at 20 °C)	(#2)
• Maximum temperature of the liquid, T_{max}	50 °C	
• Minimum temperature of the liquid, T_{min}	−10 °C	
• Ambient temperature range	−25 to 55 °C	
• Accuracy class	0.5	

(#1) Minimum pressure required for effective operation of the gas elimination device.

(#2) The flowmeter is adjusted for use with one product viscosity. Fuels include kerosene, distillate and various grades of petrol (which may include up to 10% ethanol). The pattern and variants are constructed for use to dispense various grades of pure biodiesel and biodiesel/distillate blends (to Australian government standard).

1.2 Description of the Metering System

The instrument has island oriented hoses (Figure 1) and incorporates the following components:

(i) A Gilbarco model GPU-90 pumping unit (Figure 2) as described in the documentation of approval NMI S455.

(ii) A measurement transducer comprising a Gilbarco model C+ (##) four piston positive displacement flowmeter (Figure 3) fitted with an SK700 model Encore pulse generator;

(##) The meter may also be known as the model T19976 G3 (which may also have an 'S' suffix).

(iii) One hose/nozzle mounted on the end of the dispenser housing in an 'Island' oriented matter. The nozzles used are 16 mm ZVA Elaflex. (*)

(*) Note that the submittor must be consulted regarding the acceptability of any alternative nozzles.

1.3 Calculator/Indicator

A Gilbarco model Sandpiper 2 calculator/indicator (also known as the E101 electronic set – Figure 4) which has a single display for indicating volume and another for price. There is also a unit price display for each hose (Figure 1); a button labelled 'Push-to-Stop' may be provided in the vicinity of the indicating head.

The display limits and increments are:

Price	9999.99 in 0.01 $ increments
Volume	9999.99 in 0.01 L increments
Unit price	999.9 in 0.1 ¢/L increments

The instrument is approved with versions 25xxx, 27xxx or 29xxx (*) software, which can be viewed by at power up or by forcing a restart by pushing the F1 then the F2 buttons on the Managers' keypad.

(*) 'xxx' may be a series of alphanumeric characters and may include hyphens, e.g. 27 A 04 154, 29 04 – 10 E, etc.

A pre-set device may also be fitted to allow pre-set to be selected by means of volume (litres) or price (dollars).

1.4 Descriptive Markings and Notices

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

Pattern approval sign	NMI 5/6A/230	
Manufacturer's identification mark or trade mark	.....	
Manufacturer's designation (model number)	.....	
Serial number	.....	
Year of manufacture	.....	
Maximum flow rate (Q_{max})	..... L/min	
Minimum flow rate (Q_{min})	..... L/min	
Minimum measured quantity (V_{min})	 L	(#1)
Maximum operating pressure (P_{max})	..... kPa	
Minimum operating pressure (P_{min})	..... kPa	
Nature of liquids to be measured	.....	(#2)
Maximum temperature of the liquid, T_{max}	…..°C	(#3)
Minimum temperature of the liquid, T_{min}	…..°C	(#3)
Environmental class	class C	

(#1) In addition, the minimum measured quantity (V_{min}) shall be clearly visible on any indicating device visible to the user during measurement, in the form 'Minimum delivery 2 L'.

(#2) e.g. distillate or D.

(#3) Required if liquid temperature range differs from −10 °C to 50 °C.

1.5 Sealing Provision

The gas separator test valve has provision for sealing. The meter calibration access is sealed as shown in Figure 5.

1.6 Verification Provision

Provision is made for the application of a verification mark.

1.7 Checking Facilities

An automatic segment test is performed at the start of each delivery.

The calculator monitors the presence and correct transmission of signal from the measurement transducer, and in the event of detecting a fault the instrument indicates an error code and has provision for controlling electrically-operated valves to stop the delivery.

2. Description of Variant 1 approved on 25/10/13

Certain other models and configurations of the Frontier (Electroline Mk5) T96*** series of fuel dispensers identified using Table 1 below.

TABLE 1 (incl. amendments of variant 14)

Meaning of model designations for the Frontier (Electroline Mk5) T96*** series of fuel dispensers: (the pattern is a model Frontier (Electroline Mk5) T960A1NP)

1st, 2nd and 3rd digits, Series;

T96 = Gilbarco Australia product, base model

4th digit, Model Style, e.g;

0 = Island oriented without flexmast (the pattern)
4 = Lane oriented without flexmast (variant 9)
8 = Island oriented with flexmast (variant 11)
9 = Lane oriented with flexmast (variant 11)

5th digit = Country code;

A= Australia

6th digit = Number of hoses;

1 to 4 (for up to 2 petrol grades)

7th = Flow rate;

N = Normal (50 L/min, or 42 L/min when fitted with vapour recovery)
H = High (90 L/min)
E = Extended (130 L/min)
U = Ultra high (160 L/min)
M = Mixed (combination of N and H hydraulics)
G = Mixed (combination of N and U hydraulics)
Q = Mixed (combination of H and U hydraulics)

8th = Hydraulic module; (relates to petrol/diesel only – 9th digit applies if DEF (AdBlue) is included – variant 13)

P = Pump (suction pumping unit, either type GDP-90 or GDP-140)
D = Dispenser (pressure system using approved submersible turbine pump)

9th = Hydraulic module;

A = Always a dispenser and as per variant 13 operation, DEF (AdBlue)

3. Description of Variant 2 approved on 25/10/13

With one or more Gilbarco model Eco screw type flowmeters (Figure 6) instead of the model C+ flowmeters described for the pattern. This meter is fitted with an Eltomatic model ME 01 04 pulse generator.

4. Description of Variant 3 approved on 25/10/13

With standard pumps as described for the pattern, but with 25 mm piping, and/or 25 mm hoses, and/or ZVA Elaflex 25 mm nozzles (*), and known as **H**igh flow rate fuel dispensers with the following field of operation:

- For use with distillate
- Maximum flow rate (Q_{max}) 90 L/min
- Minimum flow rate (Q_{min}) 9 L/min
- Minimum measured quantity (V_{min}) 5 L

5. Description of Variant 4 approved on 25/10/13

With Gilbarco model GPU-140 pumping units with 32 mm piping, and/or 32 mm hoses, and/or ZVA Elaflex 32 mm nozzles (*), and known as **E**xtended flow rate fuel dispensers with the following field of operation:

- For use with distillate
- Maximum flow rate (Q_{max}) 130 L/min
- Minimum flow rate (Q_{min}) 13 L/min
- Minimum measured quantity (V_{min}) 5 L

6. Description of Variant 5 approved on 25/10/13

With two Gilbarco model GPU-90 pumping units in parallel, with 32 mm piping, 32 mm hoses, and ZVA Elaflex 32 mm nozzles (*), and known as **U**ltra-high flow rate fuel dispensers with the following field of operation:

- For use with distillate
- Maximum flow rate (Q_{max}) 120 – 160 L/min
- Minimum flow rate (Q_{min}) 12 – 16 L/min
- Minimum measured quantity (V_{min}) 5 L

(*) Note that the submittor must be consulted regarding the acceptability of any alternative nozzles.

7. Description of Variant 6 approved on 25/10/13

With one or more compatible submersible turbine pumps (STPs) incorporating a leak detection system (Figure 7). The STP replaces the equivalent components (i.e. motor, pump/strainer/gas separator, and associated pipework) in certain fuel dispensers covered by this approval.

Dispensers may operate with the standard maximum flow rate, Q_{max} of 50 L/min, or dispensers for use with distillate may be used with the **U**ltra-high maximum flow rate, Q_{max} of 160 L/min.

8. Description of Variant 7 approved on 25/10/13

The pattern and variants for use to dispense various grades of petrol which may include up to 85% ethanol ('E85').

9. Description of Variant 8 approved on 25/10/13

Instruments are fitted with a Gilbarco Stage 2 (VR2) vapour recovery and monitoring system and are used up to a maximum flow rate of 42 L/min. A typical instrument is shown in Figure 8.

The vapour recovery and monitoring system is approved by the German TÜV SÜD Industrie Service GmbH authority.

Only vapour recovery components and systems as listed below and included in the relevant TÜV approval certificates may be used.

The relevant TÜV approvals (and the approved components) are:

(i) For collection of vapour:

- TÜV 85-2.128 (electric valves); or
- TÜV 85-2.160 (manual valves),

and the only approved system components are:

- Vapour recovery nozzles – Elaflex models ZVA 200 GR, ZVA SLIMLINE 2 GR, or ZVA SLIMLINE 2 GRVP.
- Coaxial hose – Elaflex model Conti Slimline 21/8 Coax.
- Control valves – Burkert model 6022 / 2832 or GVR model EPV10.
- Control & monitor board – Gilbarco model VRB.
- Vapour recovery pump(s) – Durr models MEX 0831-10, MEX 0831-11, or MEX 0544.

(ii) For automatic monitoring of the vapour to fuel ratio:

- TÜV UE-12.5,

and the only approved system components are:

- Gilbarco (GVR) model VMC monitor.
- Gilbarco (GVR) model GE1 flowmeter.

10. Description of Variant 9 approved on 25/10/13

Certain models of this approval without or with a flexmast (Figures 9 or 10, respectively), instruments may be identified using Table 1, with a separate hose mast alongside the dispenser (Figure 9).

11. Description of Variant 10 approved on 25/10/13

The T968* series of dispensers (Figure 10).

Instruments may be identified using Table 1, where the series number is 'T968*****' when fitted with a flexmast facility.

12. Description of Variant 11 approved on 25/10/13

With an amended unit price change operation for single grade pumps and dispensers only, when the unit price is changed from the control console the old unit price and transaction data are reset to 0.00. The new unit price will not be displayed until the nozzle is lifted, and when the nozzle is lifted for the first time the unit price is displayed for 5 seconds before the delivery may start. Once used the first time the new unit price will be retained on the display and there will be no (5 second) delay before a delivery may commence.

13. Description of Variant 12 approved on 22/04/14

With one or more Gilbarco model V flowmeters (Figure 11) which may also be known as the model V+, instead of the model C+ flowmeters described for the pattern. This meter is fitted with an Encore 510 pulse generator.

13.1 Field of Operation

The field of operation of the model Gilbarco model V (or V+) meter is the same as for the C+ meter (clause 1.1 for the pattern) except as follows:

- Maximum temperature of the liquid, T_{max} 40 °C
- Minimum temperature of the liquid, T_{min} −10 °C

14. Description of Variant 13 approved on 4/11/15

With one or more nozzles for dispensing Diesel Exhaust Fluid (DEF) also known as AdBlue fluid AUS32 (aqueous urea solution 32.5%) in attendant-operated mode, or in attended self-service mode using any compatible (#) approved control console. The meter is adjusted to be correct for the liquid for which is verified.

The Endress+Hauser model *LPG mass* DN15 15 mm meters Coriolis principle mass flowmeters (Figures 12 and 13) are approved dispense only DEF (AdBlue) over a flow rate range of 4 to 40 L/min, for certain motor vehicles having heavy duty diesel engines fitted with a Selective Catalytic Reduction (SCR) unit in attendant operated mode.

The mass meter is connected by ‘ModBus’ wiring in which case the K-factor used for calibration is stored in the meter.

14.1 Field of Operation

The field of operation of the AdBlue measuring system is determined by the following characteristics:

- Minimum measured quantity, V_{min} 2 L
- Maximum flow rate, Q_{max} 40 L/min
- Minimum flow rate, Q_{min} 4 L/min
- Maximum pressure of the liquid, P_{max} 320 kPa
- Minimum pressure of the liquid, P_{min} 50 kPa (#1)
- Dynamic viscosity (at 25 °C) 1.4 mPa.s (#2)
- Maximum temperature of the liquid, T_{max} 30 °C
- Minimum temperature of the liquid, T_{min} 0 °C
- Ambient temperature range −25 to 55 °C
- Accuracy class 0.5

(#1) Minimum pressure required for effective operation of the gas elimination device.

(#2) The flowmeter is adjusted to be correct for AdBlue fluid AUS32 (aqueous urea solution 32.5%) for which it is to be verified.

14.2 Sealing Provision

The meter calibration access including Modbus connections are sealed as shown in Figure 14.

15. Description of Variant 14 **approved on 25/02/16**

With certain additional models and configurations of the Frontier (Electroline Mk5) T97*** series of fuel dispensers, now listed in Table 1 (variant 1) as having an ‘M’ as the 8th digit and/or as having an ‘A’ as the 9th digit.

16. Description of Variant 15 **approved on 01/03/17**
amended on 28/02/20

For use with Gilbarco Apollo calculator/indicator. This indicator is approved with versions A30xxx software, which can be viewed as described above in clause **1.3 Calculator/Indicator**

17. Description of Variant 16 **approved on 01/03/17**

With one or more Krohne model BatchFlux 3200C electromagnetic flowmeters (Figure 15 &16) for dispensing Diesel Exhaust Fluid (DEF) also known as AdBlue fluid AUS32 (aqueous urea solution 32.5%).

18. Description of Variant 17 **approved on 27/06/17**

With the pattern or variants having one or more remote displays and nozzles mounted away from the main dispenser housing (Figure 17).

19. Description of Variant 18 **provisionally approved on 27/09/22**
approved on 13/12/22

With a variant of the Gilbarco Apollo Calculator/indicator approved with versions A32xxx software, which can be viewed as described above in clause **1.3 Calculator/Indicator**

Instruments shall be tested in accordance with any relevant tests specified in the National Instrument Test Procedures.

Tests should be conducted in conjunction with any tests specified in the approval documentation for any components used, including indicator/controller and submersible turbine pump (STP) hydraulic systems.

The instrument shall not be adjusted to anything other than as close as practical to zero error, even when these values are within the maximum permissible errors.

Maximum Permissible Errors

The maximum permissible errors are specified in Schedule 1 of the *National Trade Measurement Regulations 2009*.

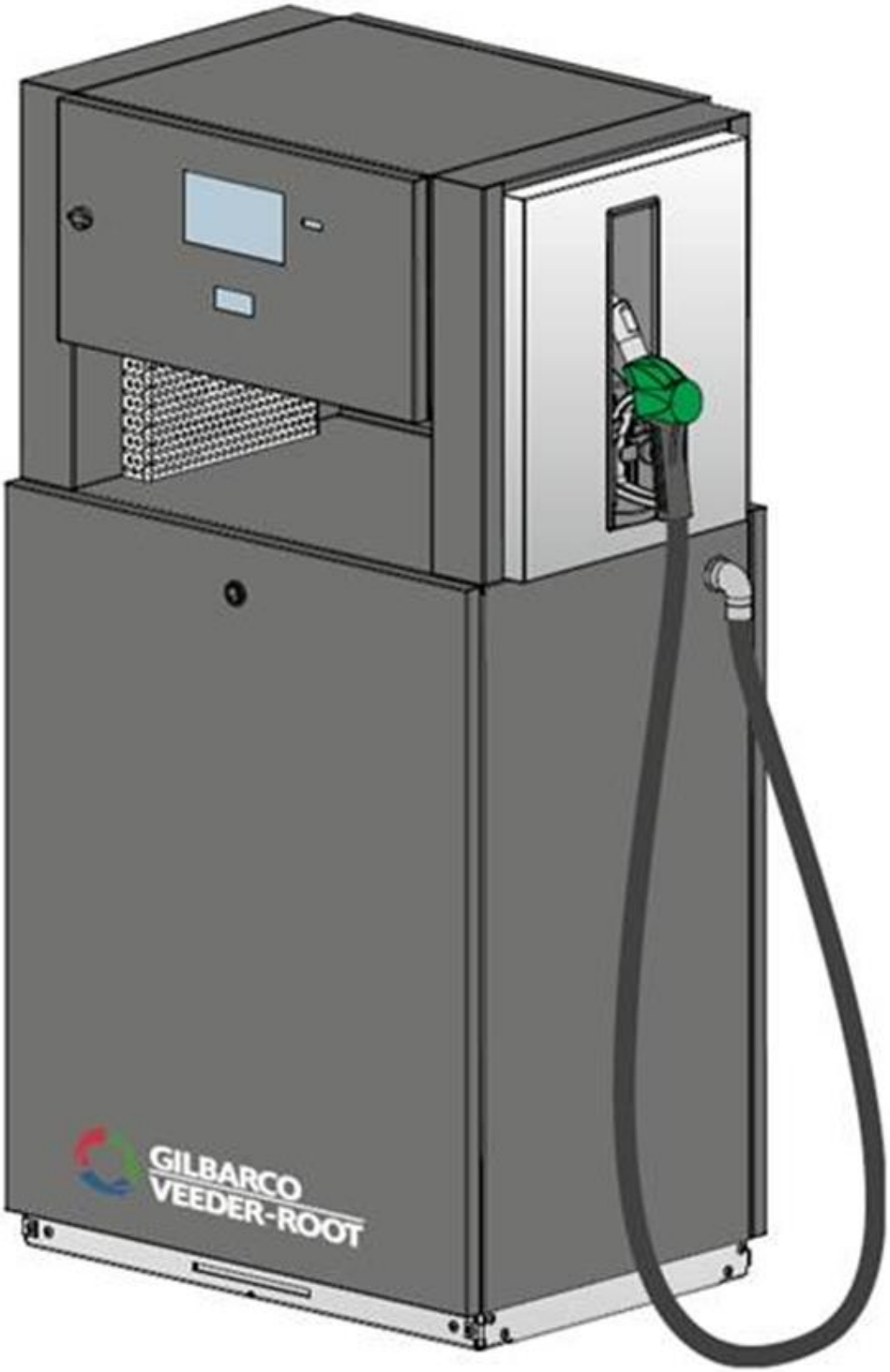
Hose Configuration

Gilbarco Frontier series, 2 Hose model (Figure 18)
Where the serial number on the data plate is 12345, hose letters are added to the instrument serial number for individual hose serial numbers e.g. 123456A and 123456B.

Gilbarco Frontier series, 3 Hose model (Figure 19)
Where the serial number on the data plate is 12345, hose letters are added to the instrument serial number for individual hose serial numbers e.g. a combination of 123456A **or** 123456B **or** 123456C **or** 123456D.

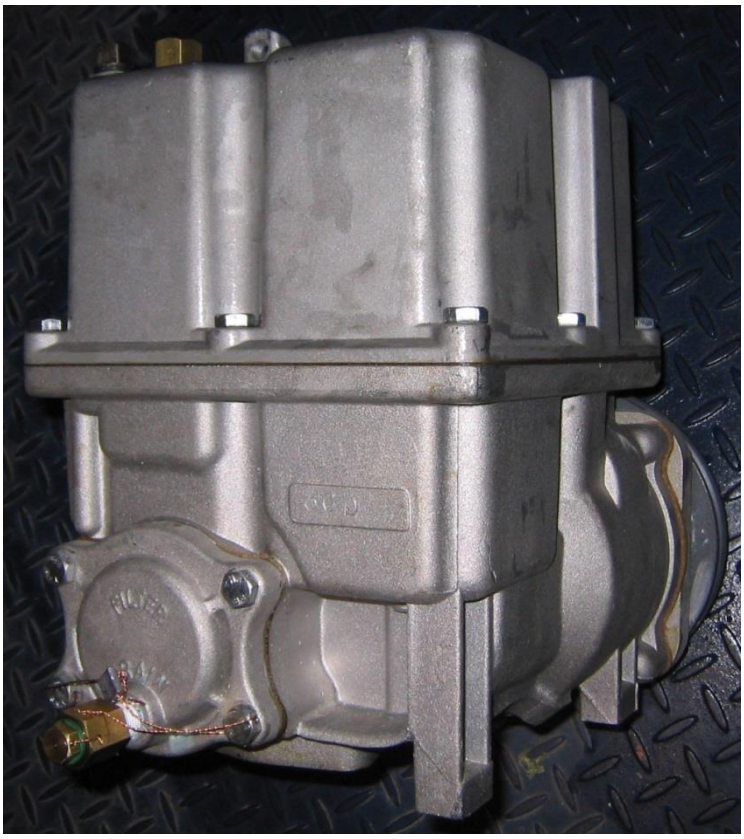
Gilbarco Frontier series, 4 Hose model (Figure 20)
Where the serial number on the data plate is 12345, hose letters are added to the instrument serial number for individual hose serial numbers e.g. 123456A, 123456B, 123456C and 123456D.

FIGURE 5/6A/230 – 1



A Typical Gilbarco Frontier (Electroline Mk5) T960A1NP Fuel Dispenser

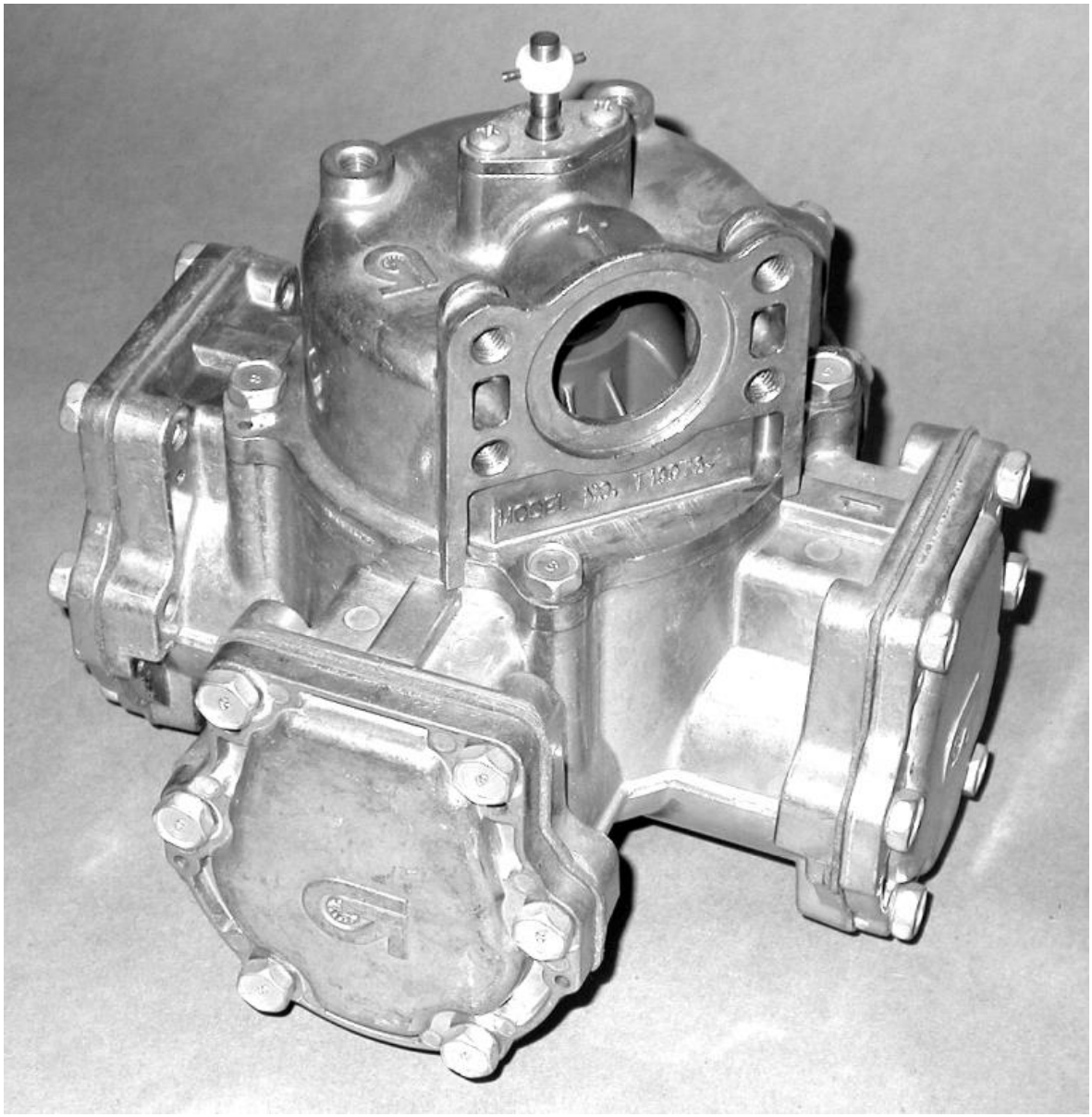
FIGURE 5/6A/230 – 2



Gilbarco Model GPU-90 Pumping Unit (without inlet filter bowl)

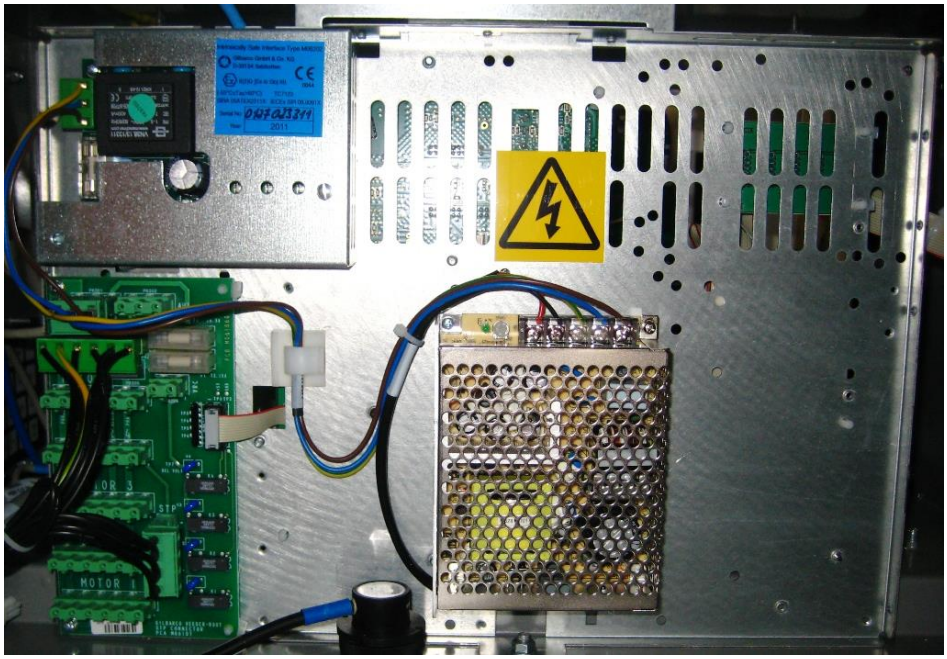
Gilbarco Model GPU-90 Pumping Unit (rear view no inlet filter bowl)

FIGURE 5/6A/230 – 3

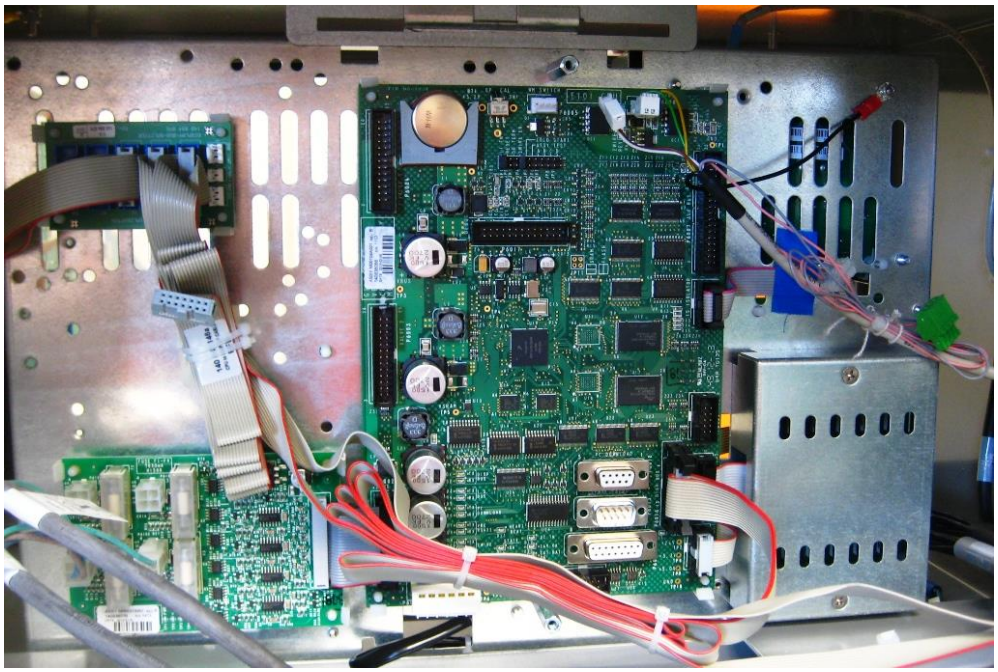


A Gilbarco Model C+ Flowmeter (aka Model T19976 G3)

FIGURE 5/6A/230 – 4



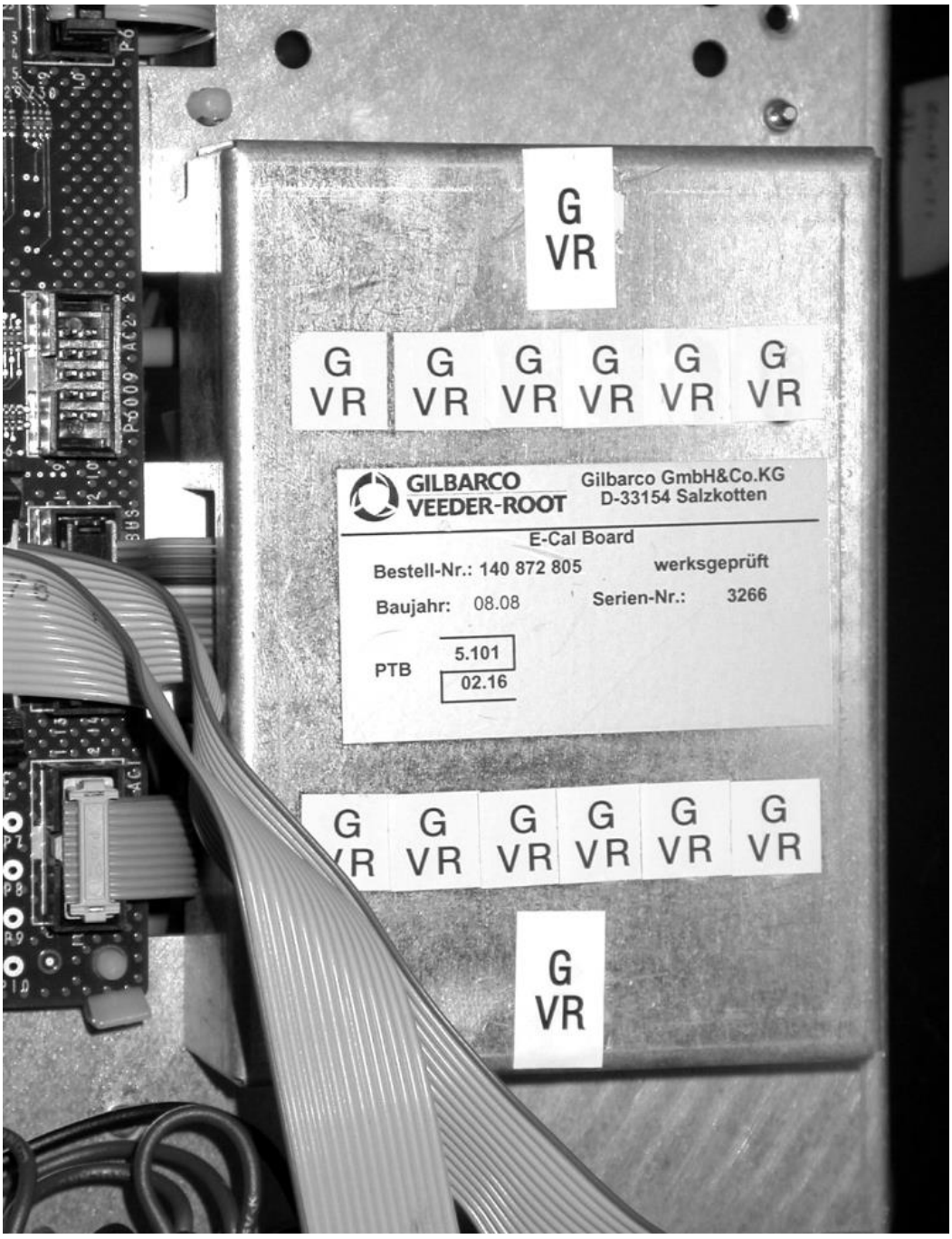
Power Supply and Driver Printed Circuit Boards



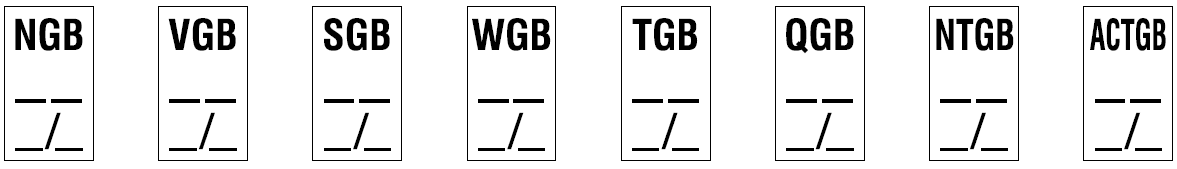
Processor PCB and Interface Cards

Sandpiper 2 Calculator/Indicator (aka Model E101) Electronics
(typical mounting arrangement)

FIGURE 5/6A/230 – 5

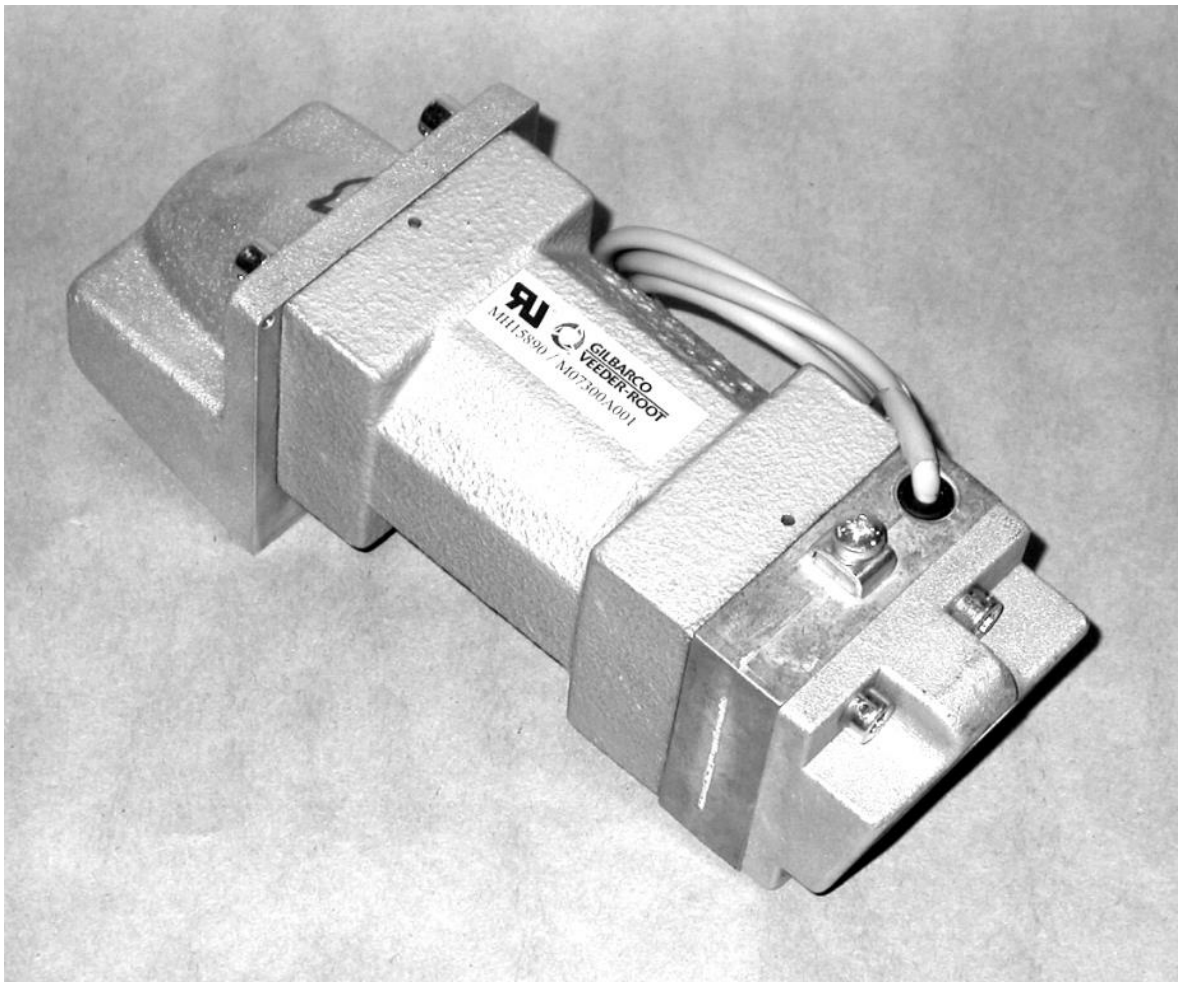


Typical Sealing of Meter Calibration Access
(using destructible adhesive labels)



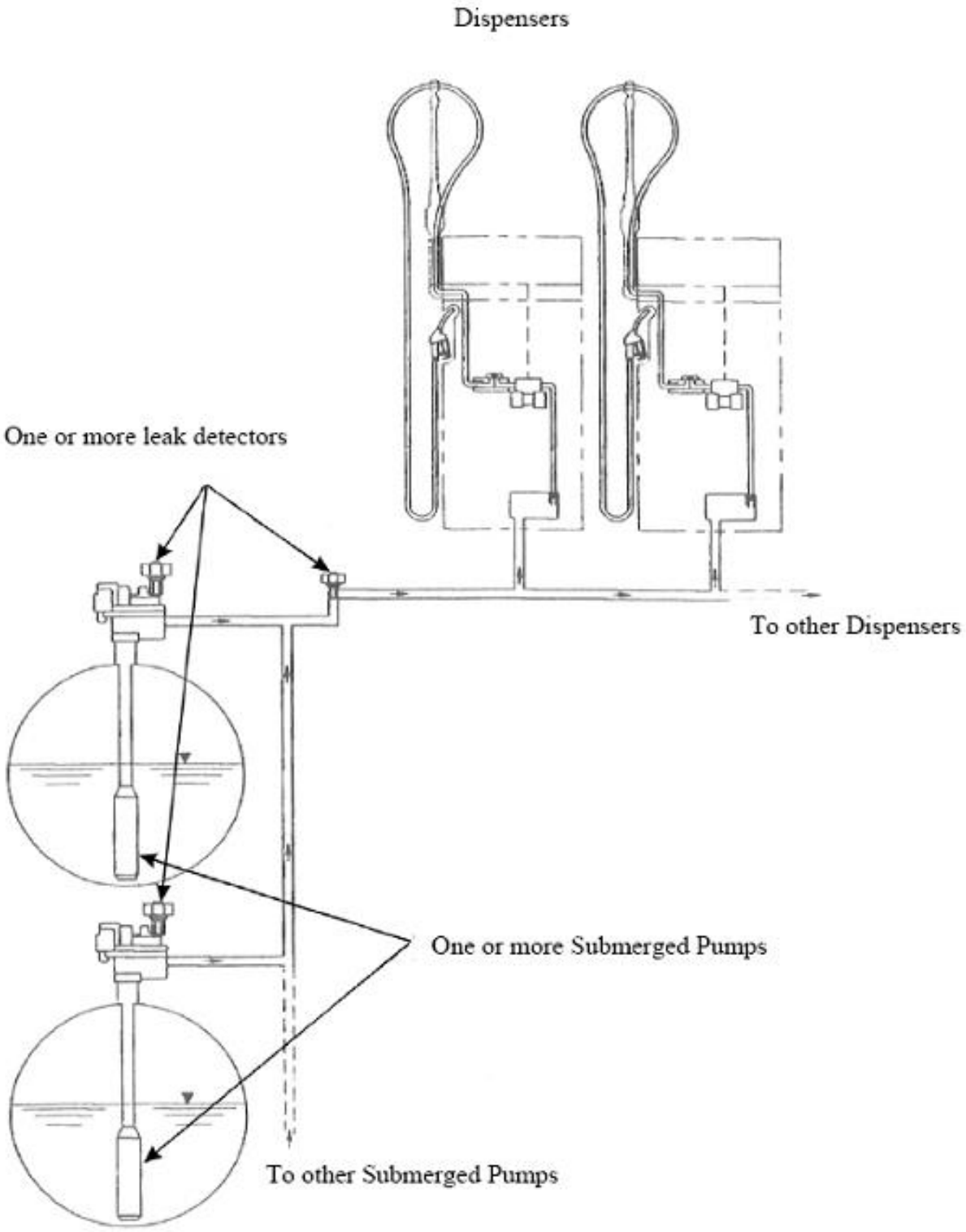
Examples of Different Seal Details

FIGURE 5/6A/230 – 6



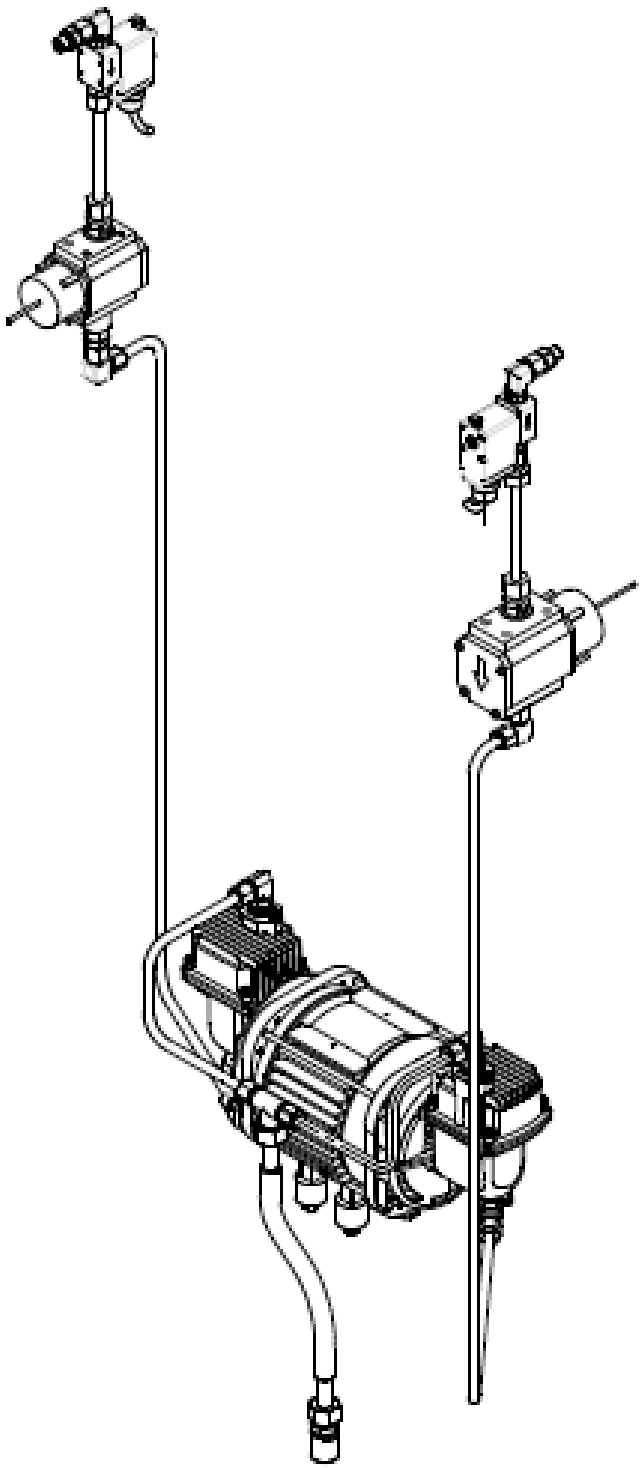
Gilbarco Model Eco Flowmeter (Variant 2)

FIGURE 5/6A/230 – 7



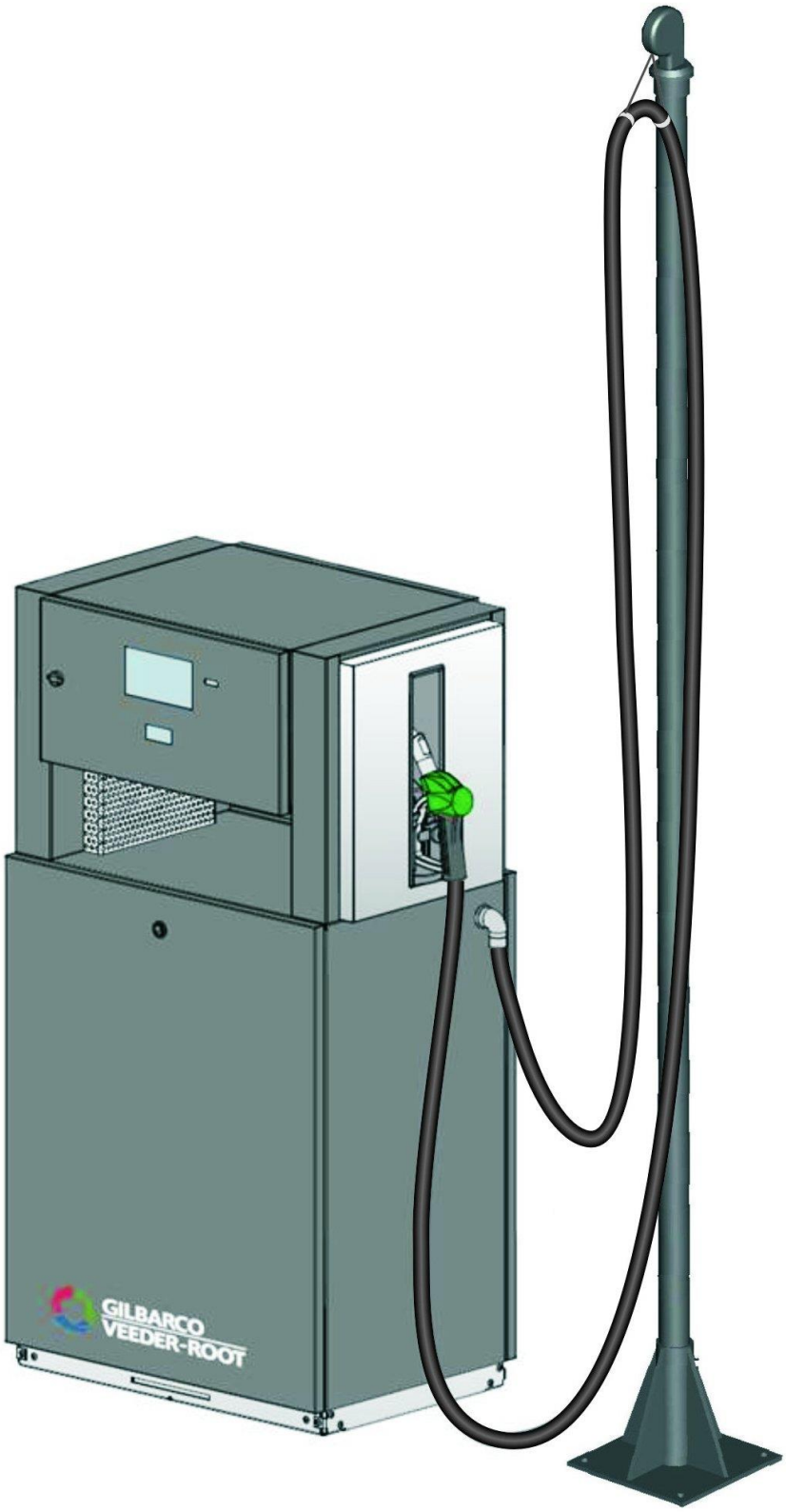
Typical Submersible Turbine Pump (STPs) System (Variant 6)

FIGURE 5/6A/230 – 8



Frontier (Electroline Mk5) T96 Series - typical arrangement of VR 2 System Hydraulic Components (Variant 8)

FIGURE 5/6A/230 – 9



With a Separate Hose Mast Alongside the Dispenser (Variant 9)

FIGURE 5/6A/230 – 10

A Typical T968 Series Dispenser (Variant 10)

FIGURE 5/6A/230 – 11

Gilbarco Model V (aka V+) Flowmeter (Variant 12)

FIGURE 5/6A/230 – 12

Typical Gilbarco Frontier (Electroline Mk5) DEF and Distillate Dispenser – Variant 13

FIGURE 5/6A/230 – 13

Typical Gilbarco Frontier DEF and Distillate Hydraulics – Variant 13

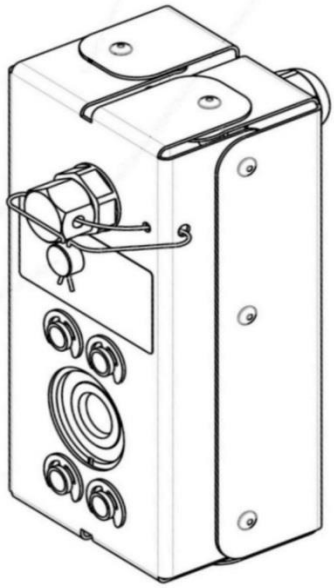
FIGURE 5/6A/230 – 14

Typical Sealing of Coriolis Meter Calibration Access (Variant 13)

FIGURE 5/6A/230 – 15

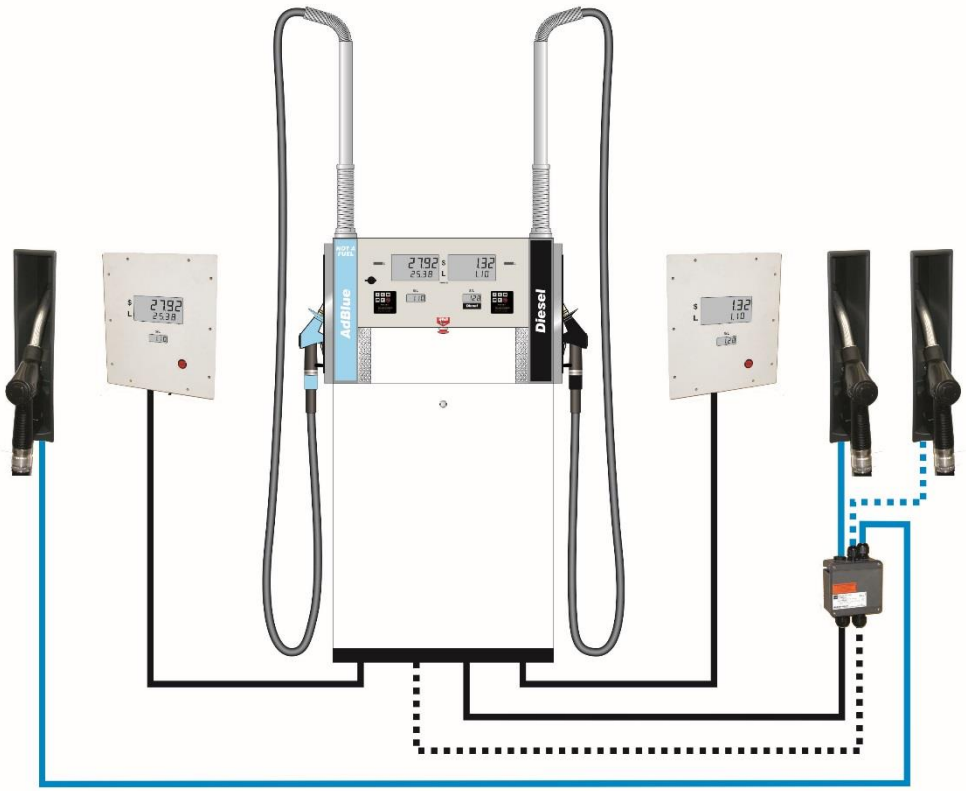
Krohne Model Batchflux 3200C Electromagnetic Flowmeter (Variant 16)

FIGURE 5/6A/230 – 16



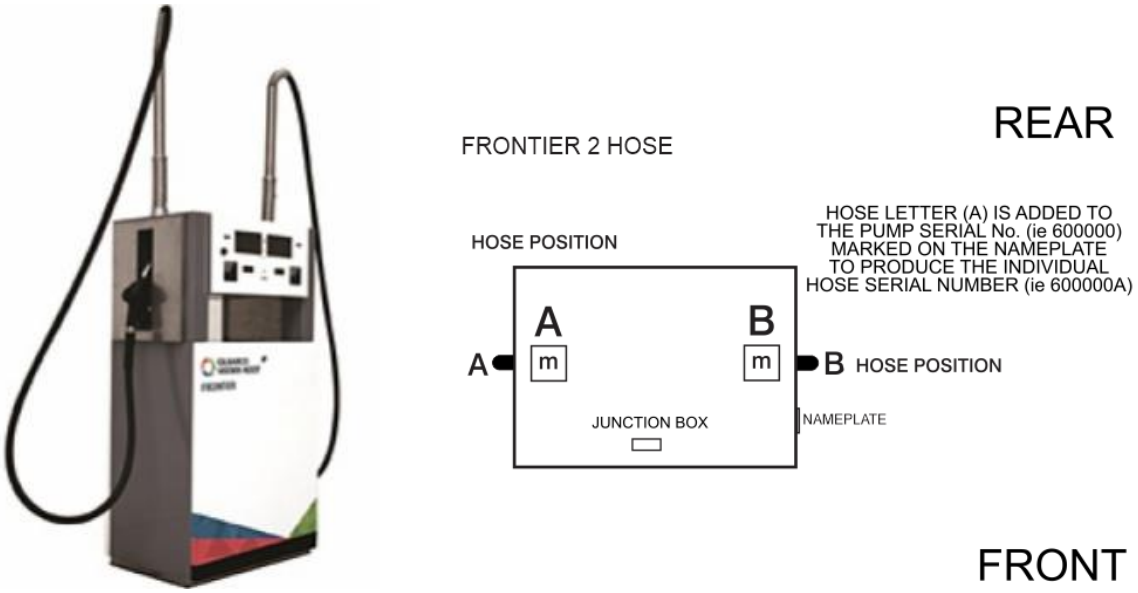
Sealing is via wire and lead slug.
In Australian model dispensers the slug will be mounted in a retaining cup that is secured to the dispenser frame

FIGURE 5/6A/230 – 17



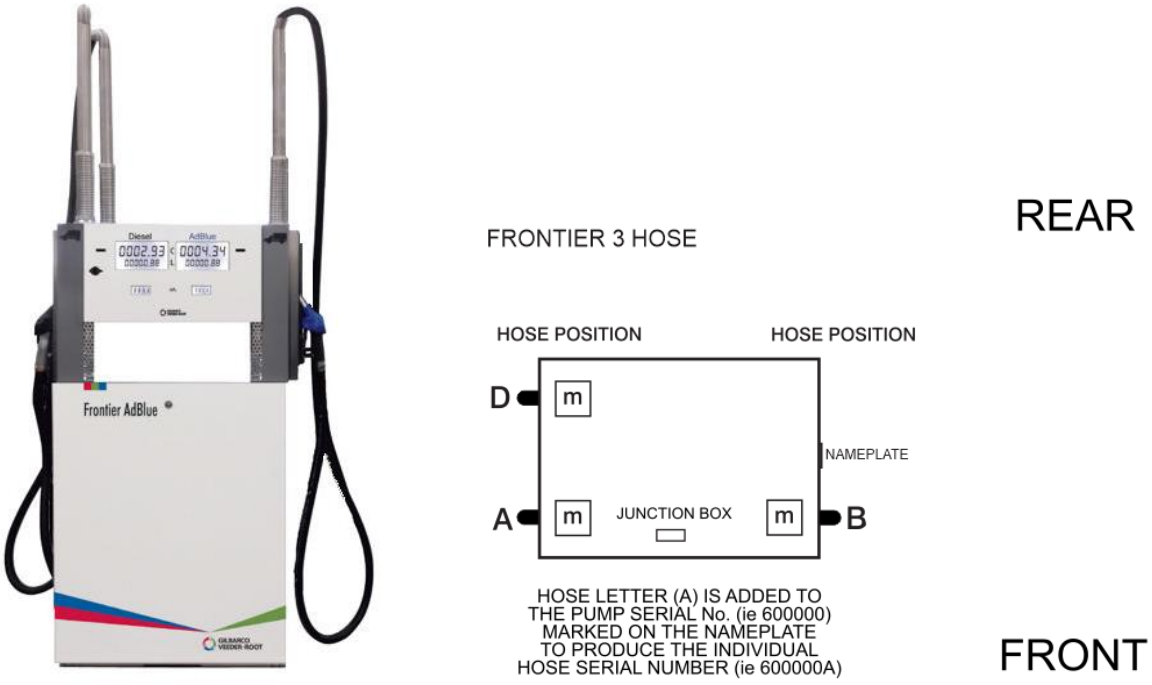
Remote display and nozzles mounted away from the main dispenser housing – Variant 17

FIGURE 5/6A/230 – 18



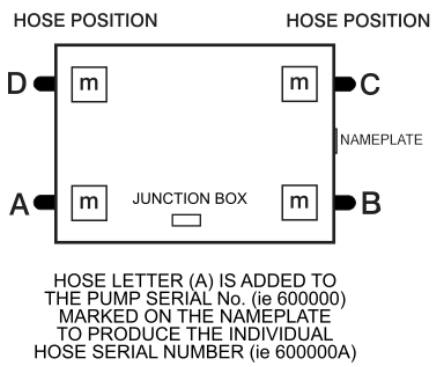
Gilbarco Frontier 2 Hose

FIGURE 5/6A/230 – 19



Gilbarco Frontier 3 Hose

FIGURE 5/6A/230 – 20



Gilbarco Frontier 4 Hose

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