



Australian Government
**National Measurement
Institute**

Bradfield Road, West Lindfield NSW 2070

Certificate of Approval

No 10/1/28

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.

Compac Model L-LPG LPG Fuel Dispenser for Motor Vehicles

submitted by Compac Industries Ltd
 52 Walls Road
 Penrose Auckland
 New Zealand

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 Measuring Systems for Liquids Other than Water, dated July 2004.

This approval becomes subject to review on 1/02/20, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern & variants 1 to 3 approved – certificate issued	20/01/15

General

Instruments purporting to comply with this approval shall be marked with pattern approval number 'NMI 10/1/28' 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 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*.

A handwritten signature in black ink, appearing to read 'A Rawlinson', with a horizontal line underneath.

Dr A Rawlinson

TECHNICAL SCHEDULE No 10/1/28

1. Description of Pattern

approved on 20/01/15

The Compac model L-LPG single hose fuel dispenser (Figures 1 and 2) is approved for refuelling motor vehicles using liquefied petroleum gas (LPG). The dispenser is approved for use in attendant-operated mode or in attended self-service mode when interfaced to a compatible (#) approved self-service device.

This model generally has the nozzle holder on the end of the dispenser with one display per side (Figure 1) although the nozzle holder may be on the front (display) side of the dispenser. Also, these models may leave out the display on one side.

(#) '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} 4 L/min
- LPG density range (at 15°C) 505 kg/m³ to 570 kg/m³
- Volume conversion to 15°C over a liquid temperature range of -10°C to 50°C
- Maximum operating pressure, P_{max} 2600 kPa
- Operating pressure is maintained at least 200 kPa above the equilibrium vapour pressure of LPG
- Ambient temperature range of -25°C to 55°C
- Accuracy Class 1.0

1.2 LPG Metering System (Figure 2)

- (i) An LPG supply tank may be located either above or below the ground level.
- (ii) The pump is positioned either below the supply tank in which case the pump is designed for use in a state of flooded suction, or the pump is positioned above the supply tank in which case the pump shall be a multistage regenerative turbine LPG pump designed for use in suction lift. There shall be no restrictive fittings within ten pipe diameters of the pump inlet and the diameter of the inlet pipe is not less than the diameter of the pump inlet. The external pump by-pass relief valve is installed in a line returning to the vapour space of the supply tank. A single pump supplying LPG to several flowmeters shall be of sufficient capacity rating to ensure that when all flowmeters are in use, the flow rate through each flowmeter is greater than Q_{min} .
- (iii) A Compac model V50 mass coriolis meter (Figure 3) is installed after the filter/strainer (installed at the inlet of the LPG dispenser). This provides a Modbus RS485 output to the calculator/indicator. This data is safeguarded with a CRC checksum over the data package.

- (iv) A Parker model 2P1LKOAG1-XCO3L 2 stage solenoid operated valve or other compatible (#) valve located after the meter is controlled by the calculator/indicator. If the coriolis meter detects vapour the valve is closed and the vapour is allowed to condense due to the increase in supply pressure. Once the vapour is clear the valve opens and the delivery can continue.
- (v) A 16 mm LPG hose and/or solid piping is fitted between the solenoid valve and the nozzle along with an OPW OAS400 3/4" LPG breakaway coupling.
- (vi) A Gasguard LG1DN nozzle or any other NMI-approved compatible (#) LPG nozzle (*) may be used that is suitable for the Gallagher nozzle hang-up mechanism.
 - (*) Note that the submitter must be consulted regarding the acceptability of any alternative nozzles.
- (vii) The dispenser is provided with a recirculation line for returning the LPG back to the supply tank. The recirculation line is provided for maintenance and verification purposes.
- (#) 'Compatible' is defined to mean that no additions/changes to hardware/software are required for satisfactory operation of the complete system.

1.3 Calculator/Indicator

The calculator/indicator is a Compac model C4000 (Figure 4) as described on certificate of approval NMI S377.

The indicator comprises a single dot matrix displays showing the price, volume, plus separate displays for unit prices as well as totaliser displays for each product.

- Price up to \$9999.99 in \$0.01 increments
- Volume up to 9999.99 L in 0.01 L increments
- Unit price up to 9.999 \$/L in 0.001 \$ increments
- Totaliser up to 9 999 999 L in 1 L increments

In attended-operated mode, electronic totals for volume are displayed at the bottom of the unit price windows.

The instrument is fitted with an ENM Company model P2G729A, 4.5 V DC, electronic totaliser for indicating the volume totals in one litre graduations up to a maximum of 9 999 999 litres. The totaliser is located below the indicator.

The calculator/indicator displays the metered volume at 15°C and has facility to display the volume at operating conditions, LPG density at 15°C, and the temperature of LPG flowing through the flowmeter (refer to Test Procedure).

The calculator/indicator is approved with the software version number 29501. The version number may be viewed using the Parameter Switch (refer to Test Procedure).

1.4 Volume Conversion Device for LPG Metering

The delivery of LPG is displayed in litres at 15°C and the volume conversion is based on Table 54 published by ASTM-IP-API, '*Petroleum Measurement Tables for Light Hydrocarbon Liquids*'.

1.5 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 and stops the delivery. In the event of a power failure the displayed value for a delivery is retained.

1.6 Verification and Sealing Provisions

Provision is made for the application of a verification mark.

The 'K' factor switch located on the main circuit board is sealed (Figure 5).

1.7 Descriptive Markings and Notices

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

Pattern approval number	NMI No 10/1/28
Manufacturer's identification mark or trade mark
Manufacturer's designation (model number)
Serial number
Year of manufacture
Environmental class	class C
Maximum flow rate (Q_{max}) L/min
Minimum flow rate (Q_{min}) L/min
Maximum operating pressure (P_{max})	1800 kPa
Minimum pressure (P_{min})	200 kPa above vapour pressure
Approved for LPG density range (at 15°C)	505 kg/m ³ to 570 kg/m ³
Maximum liquid temperature (T_{max})	50°C
Minimum liquid temperature (T_{min})	-10°C
Accuracy class	class 1.0

Note: 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'.

Volume indicated for LPG shall be clearly identified as 'Litres at 15°C' or similar wording.

2. Description of Variant 1

approved on 20/01/15

Certain other models and configurations of the Laser series of LPG fuel dispensers as identified below,

- L-LPGD Laser, LPG single inlet, dual hose (Figure 6). This model generally has the nozzle holders on the front (display) sides of the dispenser and has one display per side but with two nozzles
- LL-LPG Laser, single inlet, dual hose (Figure 7). This model generally has a nozzle holder on each end of the dispenser and has two displays per side, with nozzle on each end). This model may have one display per side if required.

3. Description of Variant 2 **approved on 20/01/15**

The fuel dispenser may include a price or volume pre-set facility (Figure 8)

4. Description of Variant 3 **approved on 20/01/15**

The C4000 calculator/indicator may operate as 'stand alone' for attended service fuel dispenser or may be connected to a compatible (#) NMI approved self-service device (such as the Compac model DCA – approval NMI S454) for unattended self-service operation (Figure 9).

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

TEST PROCEDURE No 10/1/28

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

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*.

Unit price setting:

The unit price may be changed by means of the parameter switch located on the C4000 processing circuit board. Alternatively it may be changed remotely when interfaced to a compatible NMI-approved self-serve control device, in which case the parameter switch is also used to allocate the fuel dispenser number.

Calibration Adjustment:

The following procedure is used to change the calibration k-factor:

- (a) With the nozzle in its normal hung up position, press and release the k-factor switch in quick succession, until the desired setting is displayed.
- (b) Press and hold the k-factor switch; the 1st digit of the displayed setting will begin to increment. When the desired digit is displayed, release the k-factor switch.
- (c) Repeat step (b) until all digits of the desired k-factor are displayed.

To check the software version number:

1. Remove main dispenser covers.
2. Remove 4 screws of the C4000 Control Unit enclosure.
3. Make sure the nozzle is hung up.
4. Press the parameter switch 'Parameter SW1' (situated on the C4000 PCB) once.
5. 'P' will be displayed on the '\$' display.
6. The software version number, e.g. '29501' will be displayed on the 'Litres' display.

To view last sale

- The volume, Density and Temperature for the last fill can be accessed on the Parameter switch and viewed on the main display as follows
- Press and release the parameter switch passing over the Price(s), Pump number(s), and 'b' setting. The following can be displayed
- Dollars Display – Volume (in litres uncompensated)
- Litres – Density
- Price per Litre – Temperature

The left most character of the density reading indicates the nozzle side. There is a reading for side A and B

Setting Test Mode

In test mode the volume, Density and temperature is displayed on the main display. To enter test mode:

1. Ensure all nozzles are hung up.
2. Press and release the parameter switch until the top display reads 'b'.
3. Press and hold the parameter button to change the configuration to b 0001.

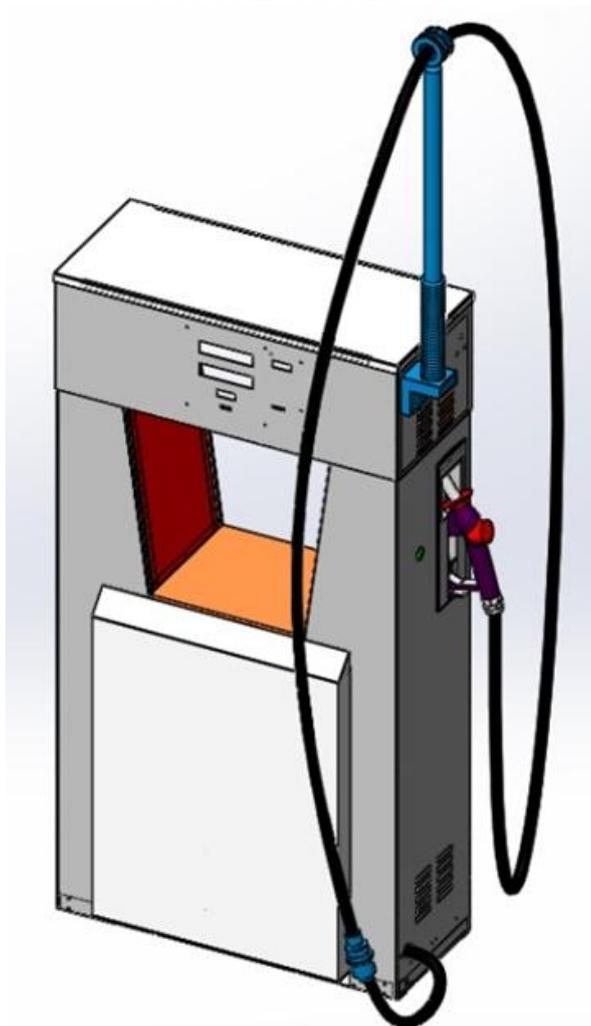
Note: 1 digit will begin to increment, repeat step 3 for all digits if required.

While in test mode the following will be displayed:

- Dollars Display – 'TEST'
- Litres – Volume (in litres uncompensated)
- Price per Litre – Toggles between temperature and density@15°C

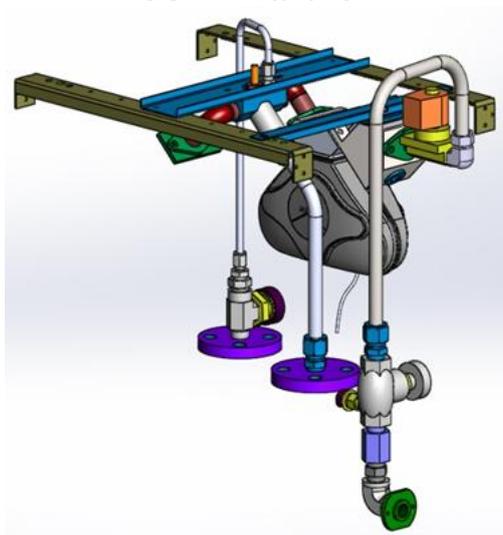
Set the 'b' setting back to 'b 0000' to leave test mode.

FIGURE 10/1/28 – 1



Compac Model L-LPG LPG Fuel Dispenser for Motor Vehicles – The Pattern

FIGURE 10/1/28 – 2



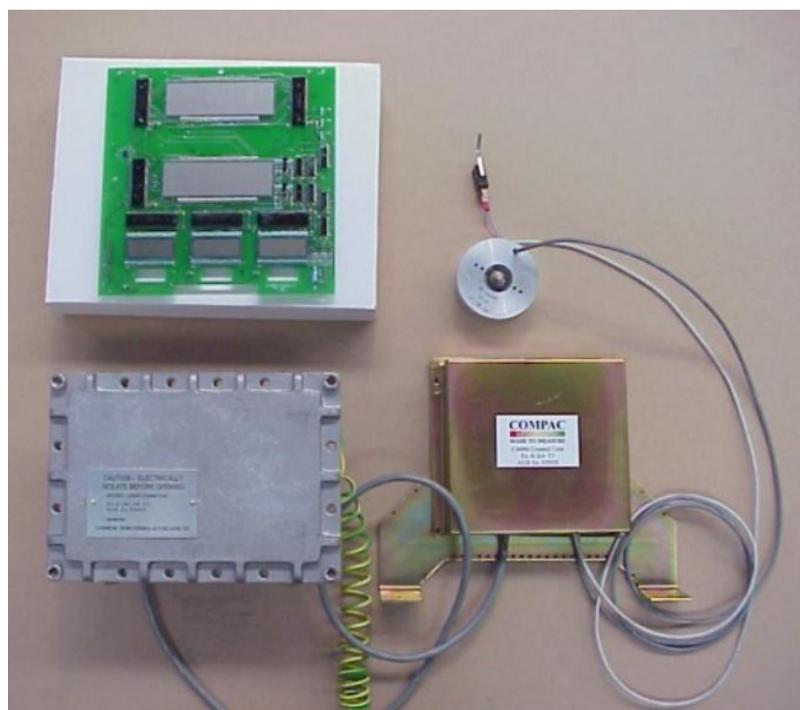
Compac Model Laser LPG Hydraulics Schematic Drawing – The Pattern

FIGURE 10/1/28 – 3



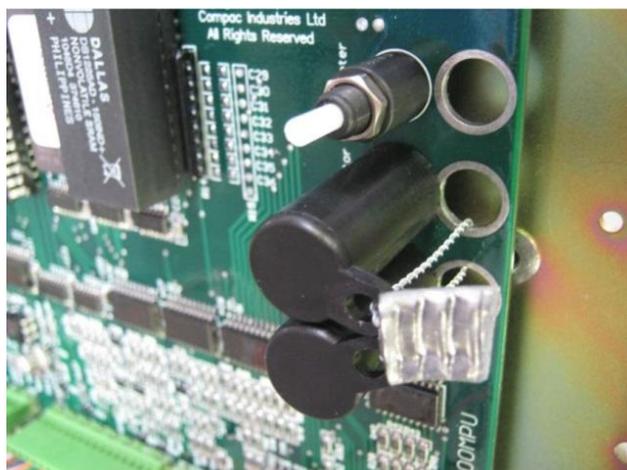
Compac Model V50 LPG Flowmeter

FIGURE 10/1/28 – 4



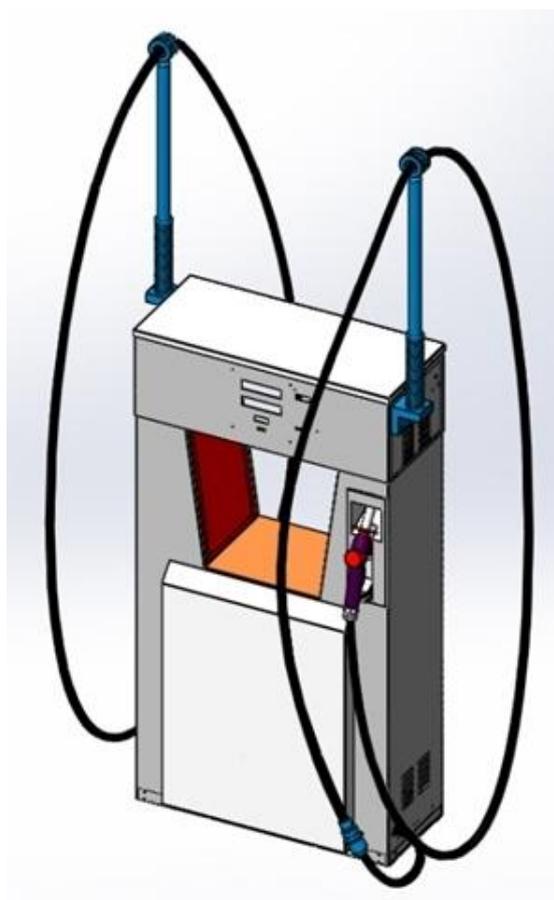
A Compac Model C4000 Calculator/Indicator

FIGURE 10/1/28 – 5



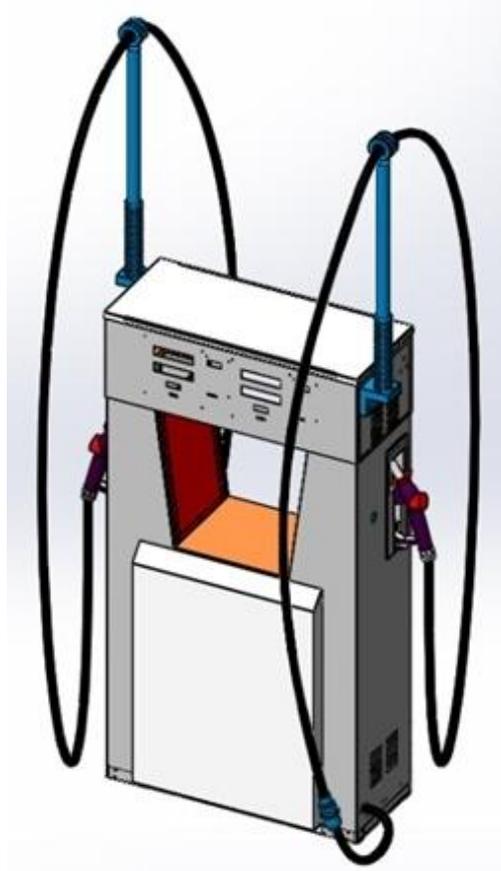
Typical Sealing Method for the Compac Model C4000 Processor PCB

FIGURE 10/1/28 – 6



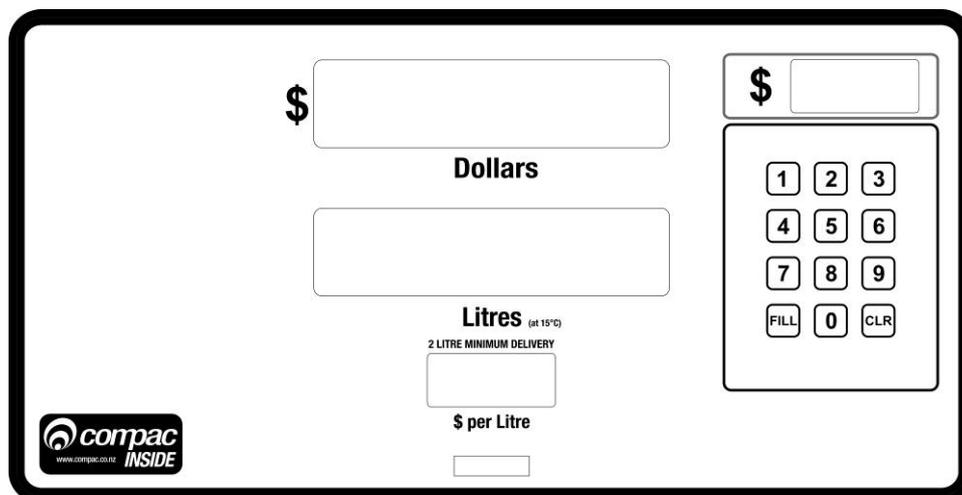
Model L-LPGD Laser, LPG Single inlet, Dual hose – Variant 1

FIGURES 10/1/28 – 7



LL-LPG Laser, Single inlet, Dual hose – Variant 1

FIGURES 10/1/28 – 8



A Price or Volume Pre-set Facility

FIGURES 10/1/28 – 9



Compac Model DCA Self-service Device

~End of Document~