Australian Government

Department of Industry, Science, Energy and Resources

National Measurement Institute

36 Bradfield Road, West Lindfield NSW 2070

Certificate of Approval

NMI 12/1/8

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 Laser L-CNGD15 Mass Compressed Gaseous Fuel Measuring System

submitted by Compac Industries Ltd
52 Walls Road
Penrose Auckland 1061
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 139, *Compressed Gaseous Fuel Measuring Systems for Vehicles*, dated March 2011.

This approval becomes subject to review on 1/12/23, and then every 5 years thereafter.

DOCUMENT HISTORY

Rev	Reason/Details	Date
0	Pattern and variants 1 to 4 provisionally approved – interim certificate issued	25/08/04
1	Pattern and variant 1 approved – interim certificate issued	14/10/05
2	Pattern and variants 1 & 2 approved; variant 3 provisionally approved – certificate issued	20/07/06
3	Pattern and variants 1 to 3 reviewed & updated; variant 3 approved – certificate issued	18/08/11

DOCUMENT HISTORY (cont…)

Rev	Reason/Details	Date
4	Pattern and variants 1 to 3 (Test Procedure) amended – certificate issued	10/05/12
5	Pattern and variants 1 to 3 reviewed - Pattern Amended (Any compatible NMI approved Calculator/indicator) - certificate issued	21/01/19
6	Variant 4 and 5 approved – certificate issued	18/05/20

CONDITIONS OF APPROVAL

General

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 12/1/8' and only by persons authorised by the submittor.

Instruments purporting to comply with this approval and currently marked 'NMI P12/1/8' may be re-marked 'NMI 12/1/8' but 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 Certificates No S1/0/A or 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*.

Darryl Hines
Manager
Policy and Regulatory Services

TECHNICAL SCHEDULE No 12/1/8

1. Description of Pattern approved on 14/10/05

A Compac model Laser L-CNGD15 mass fuel measuring system for refuelling motor vehicles using compressed gaseous fuel. Instruments are approved for attendant-operated mode, or in attended self-service mode when interfaced to a compatible (#) approved fuel dispenser controller.

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

1.1 Field of Operation

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

- Minimum measured quantity, M_{min} 2 kg
- Maximum flow rate, Q_{max} 15 kg/min
- Minimum flow rate, Q_{min} 1 kg/min
- Ambient temperature range -25°C to 55°C
- Maximum inlet pressure 35 000 kPa
- Accuracy Class 1.5
- Nature of fuels to be measured, e.g. natural gas, biogas (predominately methane)

1.2 Component Structure

The system is a Compac model Laser L-CNGD15 dual dispenser (Figures 1 and 2, and Table 1) and has components as detailed below.

(i) Measurement Transducer

The measurement transducers are two Compac model KG-80 coriolis principle mass flowmeters which provide electrical pulse output proportional to gas throughput.

(ii) Calculator/indicator

The Laser L-CNGD15 dispenser incorporates a Compac model C4000 electronic price-computing calculator/indicator (Figure 3) or any other compatible (#) NMI-approved calculator/indicator, compatible to receive electrical pulse or serial output from a model KG-80 or KG100 mass flowmeter.

The unit of measurement for measured quantities is kg.

The unit of measurement for price and unit price is dollars ($) or cents (c).

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

(iii) Outlet Piping

The pipework from each meter to its hose includes isolating valves.

(iv) Hose, Nozzle and Transfer Point

Each meter in the dispenser is fitted with a delivery hose having a nominal bore of approximately 10 mm and may have a return vent line having a nominal bore of approximately 3 mm.

The delivery hose and the return vent line are supported on a hose mast and are fitted with hose-break couplings.

The transfer point is in the form of a ball valve which starts and stops the flow of gas through the Parker model H4-62 refuelling connection. A bleed valve is also fitted to vent the gas between the hose-break coupling and the transfer point.

1.3 Markings and Notices

Instruments carry the following markings, together in one location:

Manufacturer's mark, or name written in full	Compac, NZ
Model designation	.....
Serial number of the instrument	.....
Pattern approval mark for the instrument	12/1/8
Maximum flow rate	..... kg/min
Minimum flow rate	..... kg/min
Minimum delivery (*)	..... kg
Maximum operating pressure	35 000 kPa

(*) Marked on the fuel dispenser indicator.

1.4 Sealing Provision

Provision is made for the calibration adjustment switches located in the calculator/indicator to be sealed (Figure 4 for the C4000 calculator/indicator).

1.5 Verification Provision

Provision is made for the application of a verification mark.

2. Description of Variant 1 approved 14/10/05

Certain other models/configurations as listed in Table 1, including single meter/hose/nozzle dispensers and dual dispensers with each meter/hose/nozzle operating at different maximum flow rates.

The pattern, model L-CNGD15, uses a Laser housing as shown in Figure 1.

A typical Legend housing dispenser is shown in Figure 5.

3. Description of Variant 2 approved 19/07/06

With a delivery hose having a nominal bore of approximately 12.5 mm allowing use with up to a maximum flow rate of 50 kg/min, in which case the model number has a '50' suffix rather than a '15' suffix as in the 15 kg/min instruments.

Instruments may also use air-actuated valves in place of the electrically-operated solenoids.

4. Description of Variant 3 approved 18/08/11

With a delivery hose having a nominal bore of approximately 19 mm allowing use with up to a maximum flow rate of 80 kg/min, in which case the model number has an ‘80’ suffix.

These systems have other changes to the hydraulics including an extra regulator in parallel with the standard regulator, and air-actuated valves in place of the electrically-operated solenoids.

TABLE 1

Model Number	Housing/ Frame	Single/ Dual	Display/s	Maximum Flow Rate/s (Q_{Max})
L-CNG15	Laser	Single	1 or 2	15 kg/min
L-CNG50	Laser	Single	1 or 2	50 kg/min
L-CNG80	Laser	Single	1 or 2	80 kg/min
L-CNGD15	Laser	Dual	2	15 kg/min
L-CNGD50	Laser	Dual	2	50 kg/min
L-CNGD80	Laser	Dual	2	80 kg/min
L-CNGD50-15	Laser	Dual	2	50/15 kg/min
L-CNGD80-15	Laser	Dual	2	80/15 kg/min
LGDCNG15	Legend	Single	1 or 2	15 kg/min
LGDCNG50	Legend	Single	1 or 2	50 kg/min
LGDCNG80	Legend	Single	1 or 2	80 kg/min
LGDCNGD15	Legend	Dual	2	15 kg/min
LGDCNGD50	Legend	Dual	2	50 kg/min
LGDCNGD80	Legend	Dual	2	80 kg/min
LGDCNGD50-15	Legend	Dual	2	50/15 kg/min
LGDCNGD80-15	Legend	Dual	2	80/15 kg/min

Approved Models and Configurations

5. Description of Variant 4 approved 18/05/20

With models having quad hose configuration as shown in Table 2. These models have two calculator/indicators and 4 displays. A typical quad hose model is shown in Figure 6.

TABLE 2

Model Number	Housing/ Frame	Single/ Dual	Display/s	Maximum Flow Rate/s (Q_{Max})
LGDCNGQ15	Legend	Quad	4	15 kg/min
LGDCNGQ50	Legend	Quad	4	50 kg/min
LGDCNGQ50-15	Legend	Quad	4	50/15 kg/min

Approved Models and Configurations

6. Description of Variant 5 approved 18/05/20

With the calculator/indicator of the pattern and variants now using a Compac C5000 calculator/indicator as described in the approval NMI S783

TEST PROCEDURE No 12/1/8

Instruments shall be tested in accordance with the tests specified below.

Maximum Permissible Errors

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

Hose Configuration

Laser series, Dual Hose model (Figure 7)
Laser Frame - where the serial number on the data plate is 1234, hose A1 will have the serial number 1234A1

Legend series, Dual Hose model (Figure 8)
Laser Frame - where the serial number on the data plate is 1234, hose A1 will have the serial number 1234A1

Legend series, Quad Hose model (Figure 9)
Laser Frame - where the serial number on the data plate is 1234, hose A1 will have the serial number 1234A1

Tests

1. Scope

Tests shall be carried out using the gravimetric system as set out below, or using an approved master meter.

2. Equipment

2.1 A suitable weighing instrument with a scale interval not greater than 20 g, and which is able to provide the required weighing measurements with an uncertainty not greater than ±0.67%.

2.2 Certified test masses of at least 10 kg.

2.3 Three, 60 litre **compressed natural gas** (CNG) cylinders.

2.4 Necessary valves, hoses and couplings to be able to fill and empty the cylinders.

2.5 A stopwatch to determine the flow rate.

3. Procedure

3.1 Measured quantity test

3.1.1 Set up the weighing instrument on a flat surface and out of the wind. Level the instrument, switch on, and allow for any warm-up time.

3.1.2 Zero the instrument and place the empty cylinder on the weighing platform. Either note the mass of the empty cylinder or tare off the mass of the cylinder.

3.1.3 Remove the cylinder from the weighing platform and place it in the vicinity of the fuel dispenser.

3.1.4 Connect the nozzle/hose of the fuel dispenser to the cylinder. Authorise the dispenser, open the cylinder valve, then open the refuelling nozzle and make a delivery at the maximum achievable flow rate until the cylinder is approximately 75% full. Time the filling process and determine the nominal flow rate.

3.1.5 Close the cylinder valve and the refuelling nozzle and return the nozzle/hose to the dispenser.

3.1.6 Record the quantity **(mass)** displayed by the fuel dispenser.

3.1.7 Place the cylinder on the weighing platform and record the mass (kg) indicated. Subtract the tare mass of the cylinder if the cylinder has not been tared off to obtain the mass of the gas delivered.

3.1.8 Determine the relative error as follows:

$$\frac{\text{(quantity displayed - quantity delivered)} \times 100}{\text{quantity delivered}} \ \%$$

3.1.9 Remove the partly-filled cylinder from the weighing platform and place it near to the dispenser. Connect the nozzle/hose of the fuel dispenser to the partly-filled cylinder and perform a test at or near the minimum measured quantity (M_{min}).

3.2 Testing at or near the minimum measured quantity(M_{min})

3.2.1 Perform a test at or near the minimum measured quantity by completing the delivery into the cylinder until the flow stops. Time the filling process and determine the flow rate.

3.2.2 Close the cylinder valve and the refuelling nozzle and return the nozzle/hose to the fuel dispenser. Record the quantity displayed by the dispenser.

3.2.3 Place the cylinder on the weighing platform and record the total mass of gas delivered into the cylinder. To determine the mass of gas delivered for the slow flow rate test, subtract the mass of gas delivered for the fast flow rate test.

3.3 Repeat steps 3.1.2 to 3.2.3 with at least two more test cylinders.

3.4 Check that all results are within the maximum permissible error.

3.5 Check price calculations for the quantities delivered and the unit price settings.

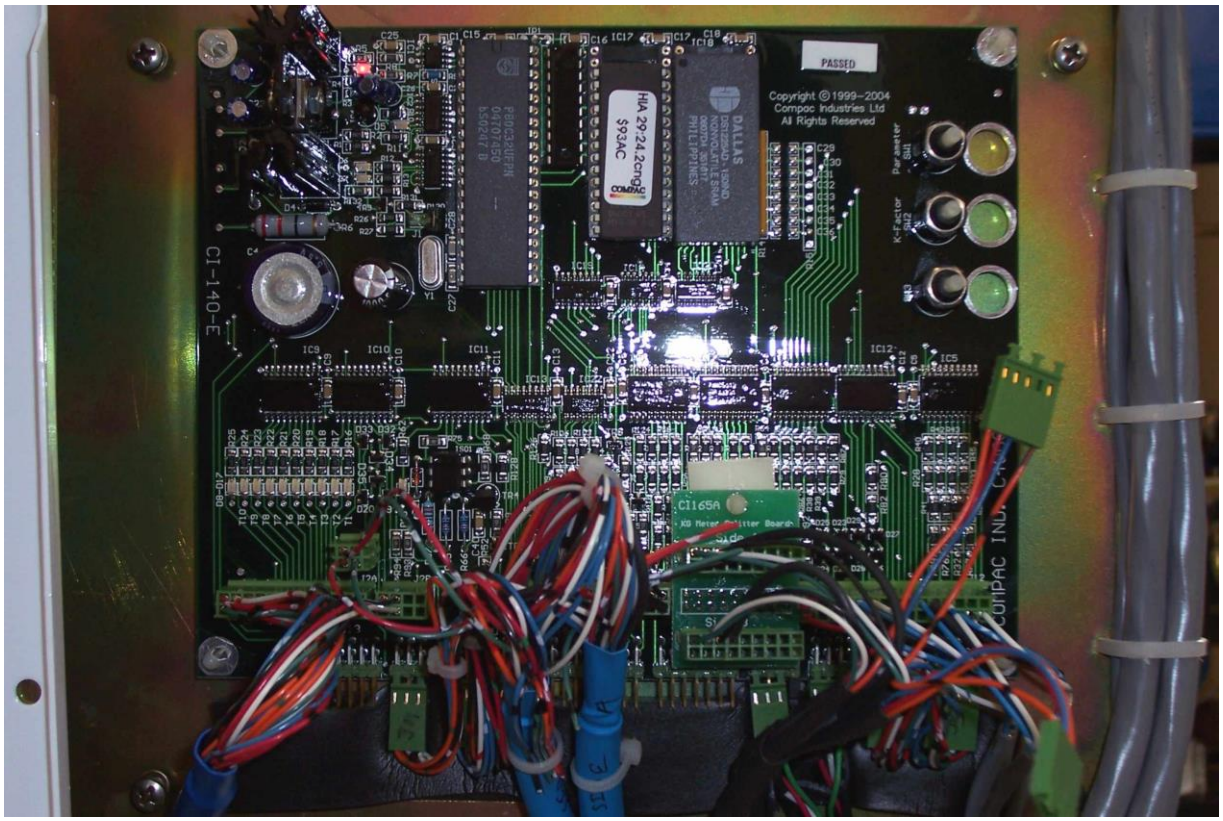
FIGURE 12/1/8 – 1

Compac Model Laser L-CNGD15 Compressed Gaseous Fuel Dispenser

FIGURE 12/1/8 – 2

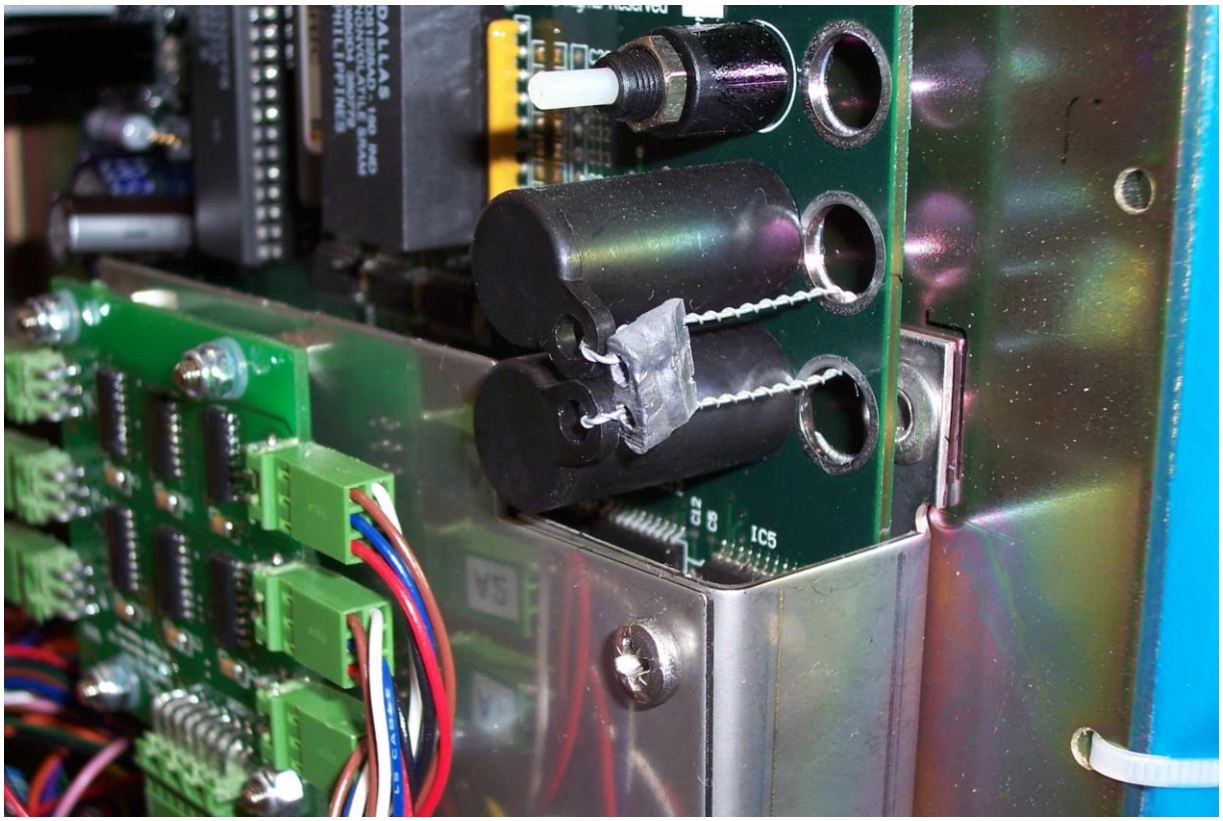
Compac Model Laser L-CNGD15 Dispenser – Hydraulics

FIGURE 12/1/8 – 3



Compac Model C4000 Calculator/Indicator Circuit Board

FIGURE 12/1/8 – 4



Typical Sealing of K-factor Switch

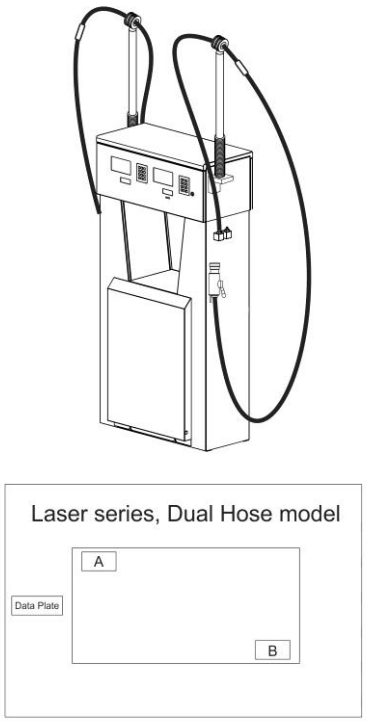
FIGURE 12/1/8 – 5

Typical Legend Dispenser Housing

FIGURE 12/1/8 – 6

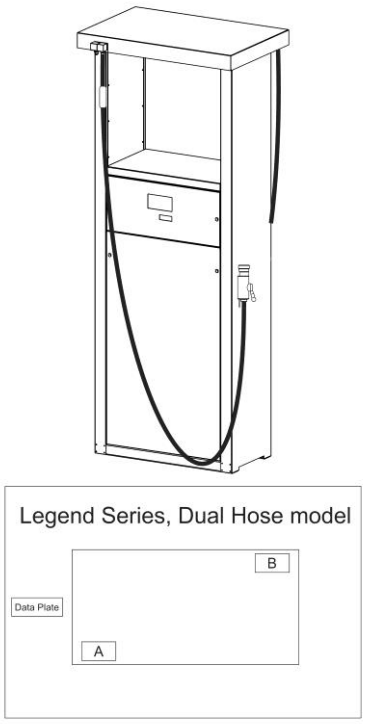
Typical Quad Hose Legend Dispenser Housing (Variant 4)

FIGURE 12/1/8 – 7



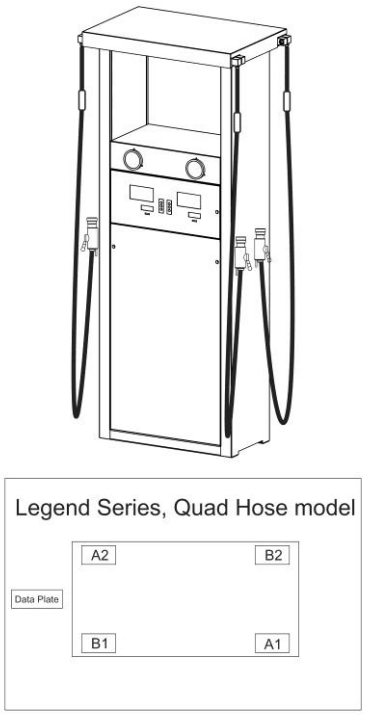
Hose Configuration Laser series, Dual Hose model

FIGURE 12/1/8 – 8



Hose Configuration Legend series, Dual Hose model

FIGURE 12/1/8 – 9



Hose Configuration Legend series, Quad Hose model

~ End of Document ~