



Australian Government

**National Measurement
Institute**

Bradfield Road, West Lindfield NSW 2070

Certificate of Approval

No 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

Compac Model Laser L-CNGD15 Mass Compressed Gaseous Fuel
Measuring System

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 OIML TC8/SC7 -
3rd CD, Compressed Gaseous Fuel Measuring Systems For Vehicles, Third
Committee Draft, dated April 2002.

CONDITIONS OF APPROVAL

This approval becomes subject to review on 1 November 2010, and then
every 5 years thereafter.

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.

The National Measurement Institute 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 Conditions of Approval: Provisional Variant 3

The approval of variant 3 becomes subject to review on 1 August 2007.

Instruments installed under this approval are to be re-verified at six-monthly intervals. The submittor is to arrange such tests and is to send the results to NMI.

In the event of unsatisfactory performance or of suitable test results not being received by NMI, this approval may be withdrawn.

DESCRIPTIVE ADVICE

Pattern: provisionally approved 25 August 2004
approved 14 October 2005

- A Compac model Laser L-CNGD15 mass fuel measuring system for refuelling motor vehicles using compressed gaseous fuel up to a maximum flow rate of 15 kg/min.

Variant: provisionally approved 25 August 2004
approved 14 October 2005

1. Certain other models/configurations including single meter/hose/nozzle dispensers

Variant: approved 19 July 2006

2. For use up to a maximum flow rate of 50 kg/min.

Variant: provisionally approved 19 July 2006

3. For use up to a maximum flow rate of 80 kg/min.

Technical Schedule No 12/1/8 describes the pattern and variants 1 to 3.

FILING ADVICE

The documentation for this approval comprises:

Certificate of Approval No 12/1/8 dated 20 July 2006
Technical Schedule No 12/1/8 dated 20 July 2006 (incl. Test
Procedure)
Figures 1 to 5 dated 20 July 2006

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.', located to the right of the signature text.

TECHNICAL SCHEDULE No 12/1/8

Pattern: Compac Model Laser L-CNGD15 Mass Compressed Gaseous Fuel Measuring System

Submittor: Compac Industries Ltd
52 Walls Road
Penrose Auckland NEW ZEALAND

1. Description of Pattern

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, V_{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 MPa
- 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) compatible to receive electrical pulse output from a model KG-80 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).

(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	25 000 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).

1.5 Verification/Certification Provision

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

2. Description of Variants

2.1 Variant 1

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.

2.2 Variant 2

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.

2.3 Variant 3

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

TEST PROCEDURE

Maximum Permissible Errors

The maximum permissible errors applicable at verification/certification and reverification are:

(i) Measured Quantity

The maximum permissible error for verification/certification shall be $\pm 1.5\%$ of the quantity delivered.

(ii) Price

The price indicated shall equal the price calculated from the volume and unit price indicated.

1. Scope

Tests shall be carried out at six-monthly intervals using the gravimetric system as set out below, or using an approved master meter. A report shall be prepared and forwarded to the National Measurement Institute.

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 $\pm 0.67\%$.
- 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 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.
- 3.2 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.
- 3.3 Remove the cylinder from the weighing platform and place it in the vicinity of the fuel dispenser.

- 3.4** 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.
- 3.5** Close the cylinder valve and the refuelling nozzle and return the nozzle/hose to the dispenser.
- 3.6** Record the quantity (**mass**) displayed by the fuel dispenser.
- 3.7** 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.
- 3.8** Determine the relative error as follows:
$$\frac{(\text{quantity displayed} - \text{quantity delivered}) \times 100}{\text{quantity delivered}}$$
- 3.9** 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 slow flow rate test by completing the delivery into the cylinder until the flow stops. Time the filling process and determine the flow rate.
- 3.10** Close the cylinder valve and the refuelling nozzle and return the nozzle/hose to the fuel dispenser. Record the quantity displayed by the dispenser.
- 3.11** 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.
- 3.12** Repeat steps 3.2 to 3.11 with at least two more test cylinders.
- 3.13** Check that all results are within the maximum permissible error. Check that the fast and slow flow rates determined in 3.4 and 3.9 are within the flow rate range marked on the nameplate of the dispenser.
- 3.14** Check price calculations for the quantities delivered and the unit price settings.

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FIGURE 12/1/8 – 1



Compac Model Laser L-CNGD15 Dispenser

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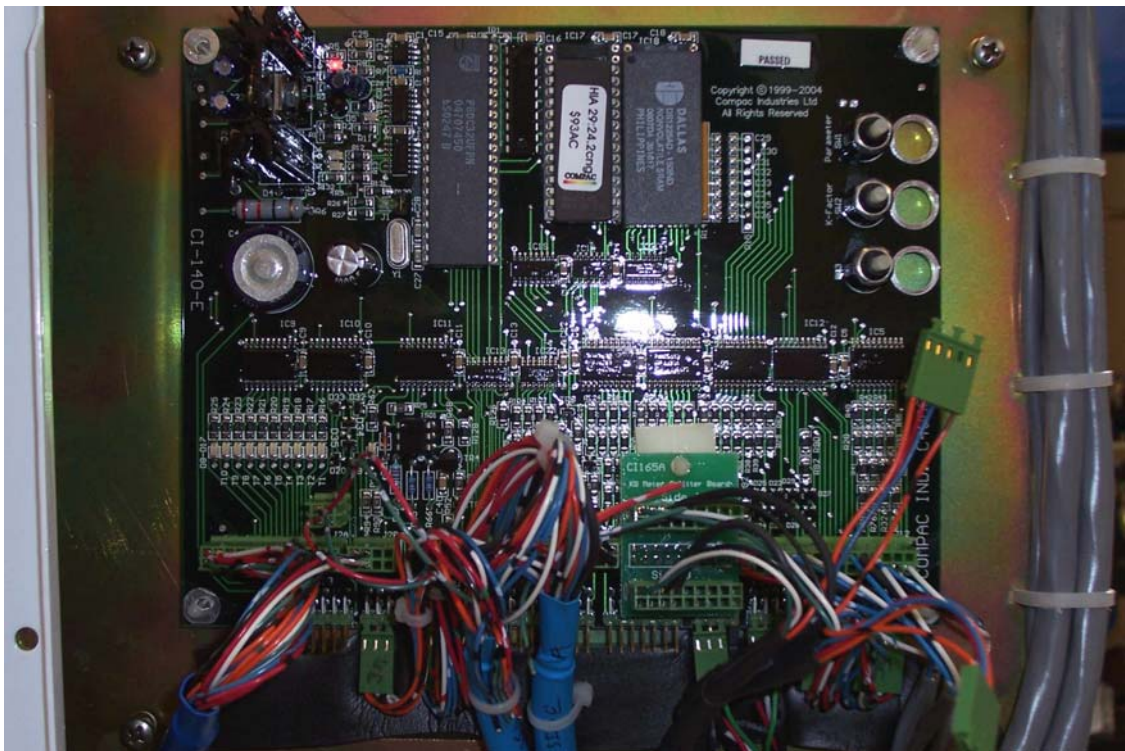
FIGURE 12/1/8 – 2



Compac Model Laser L-CNGD15 Dispenser – Hydraulics

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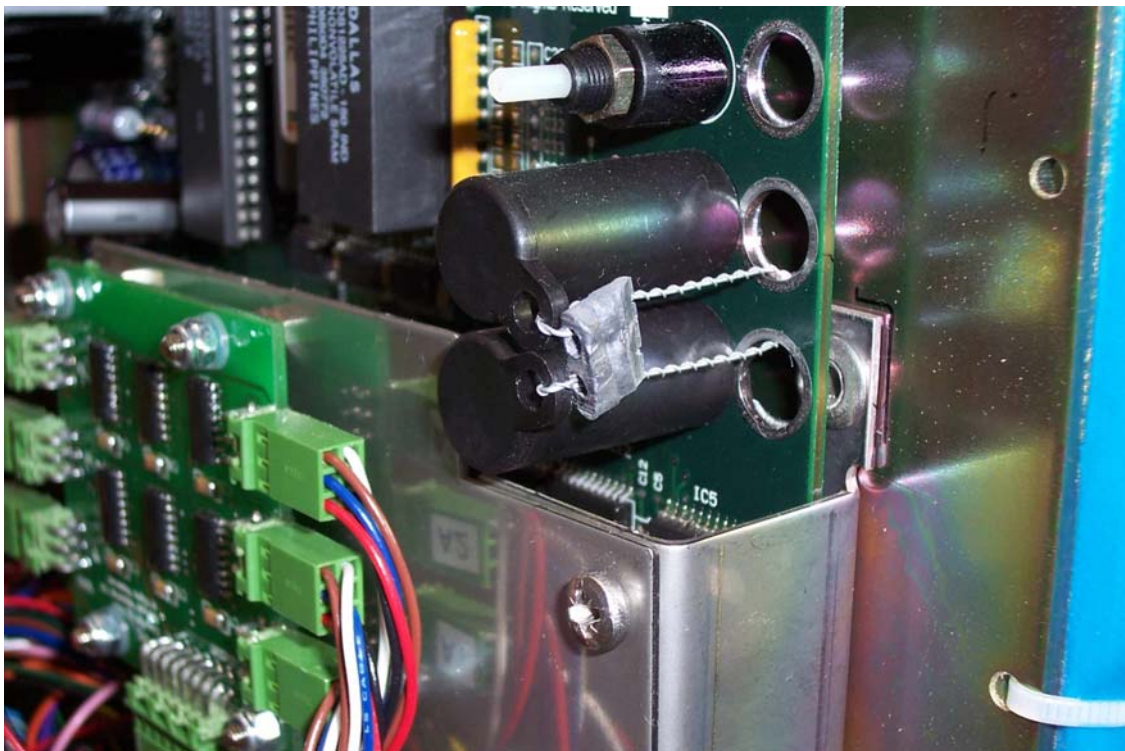
FIGURE 12/1/8 – 3



Compac Model C4000 Calculator/Indicator Circuit Board

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FIGURE 12/1/8 – 4



Sealing of K-factor Switch

FIGURE 12/1/8 – 5



Typical Legend Housing Dispenser