



**Australian Government**

**National Measurement  
Institute**

Bradfield Road, West Lindfield NSW 2070

**Cancellation  
Certificate of Approval  
NMI 10/1/26**

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 respect of the

PEC Model H9221AN LPG Fuel Dispenser for Motor Vehicles

submitted by           Gallagher Fuel Systems Ltd  
                                  (formerly PEC Fuel Pumps Ltd)  
                                  2 Station Road  
                                  Marton   4741   NEW ZEALAND

has been cancelled in respect of new instruments as from 1 August 2015.

**DOCUMENT HISTORY**

<b>Rev</b>	<b>Reason/Details</b>	<b>Date</b>
0	Pattern & variant 1 approved – interim certificate issued	3/03/11
1	Pattern & variant 1 cancelled – cancellation certificate issued	6/07/15

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 'Dr A Rawlinson', with a horizontal line underneath.

**Dr A Rawlinson**



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## **Certificate of Approval**

### **No 10/1/26**

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

PEC Model H9221AN LPG Fuel Dispenser for Motor Vehicles

submitted by      PEC Fuel Pumps Ltd  
                            2 Station Road  
                            Marton    4741    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 117-1, *Measuring Systems for Liquids Other than Water*, dated July 2004.

#### **CONDITIONS OF APPROVAL**

This approval becomes subject to review on 1 April 2016, and then every 5 years thereafter.

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 10/1/26' 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.

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.

#### DESCRIPTIVE ADVICE

**Pattern:** approved 2 March 2011

- A PEC model H9221AN fuel dispenser for motor vehicles approved for use to dispense liquefied petroleum gas (LPG).

**Variant:** approved 2 March 2011

1. Certain other models and configurations of the H9 series of LPG fuel dispensers as identified in Table 1.

Technical Schedule No 10/1/26 describes the pattern and variant 1.

#### FILING ADVICE

The documentation for this approval comprises:

Certificate of Approval No 10/1/26 dated 3 March 2011  
Technical Schedule No 10/1/26 dated 3 March 2011 (incl. Table 1 and  
Test Procedure)  
Figures 1 to 3 dated 3 March 2011

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



## TECHNICAL SCHEDULE No 10/1/26

**Pattern:** PEC Model H9221AN LPG Fuel Dispenser for Motor Vehicles

**Submittor:** PEC Fuel Pumps Ltd  
2 Station Road  
Marton 4741 NEW ZEALAND

### 1. Description of Pattern

The PEC model H9221AN fuel dispenser (Figures 1 and 2) for refuelling motor vehicles using liquefied petroleum gas (LPG). The dispenser is approved for use in attendant-operated mode, or in self-service mode when interfaced to a compatible (#) approved self service device.

(#) '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 following specifies the field of operation for which the metering system is approved:

- Minimum measured quantity,  $V_{min}$  2 L
- Maximum flow rate,  $Q_{max}$  60 L/min
- Minimum flow rate,  $Q_{min}$  10 L/min
- Maximum pressure of the liquid,  $P_{max}$  1800 kPa
- LPG density detection range (at 15°C) 505 to 570 kg/m<sup>3</sup>
- Ambient temperature range -25°C to 55°C
- Volume conversion to 15°C over a liquid temperature range of -10°C to 40°C
- Operating pressure is maintained at least 200 kPa above the equilibrium vapour pressure of LPG
- Accuracy class 1.0

#### 1.2 Description of the Metering System

- (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 filter/strainer is installed at the inlet to the LPG dispenser and upstream of the vapour eliminator.

- (iv) A Tatsuno model KA-02521 float operated vapour eliminator is fitted upstream of the flowmeter, or upstream of two flowmeters in the case of a two sided LPG dispenser. In conjunction with the pressure differential valve installed downstream of each flowmeter, the devices ensure that only liquid phase is measured by each flowmeter. In the event of excessive vapour, the LPG Measurement Technology model DSSG 2000 probe (fitted into the vapour eliminator) stops the delivery until vapour is eliminated.

Provision is made for verifying the LPG temperature measurements using the thermometer well located between the filter/strainer and the vapour eliminator.

- (v) A Tatsuno model MP02524 four-piston LPG flowmeter (Figure 3) is installed downstream of the vapour eliminator and is fitted with a PEC model 07439 dual channel pulse generator designed to produce 100 pulses per channel per meter-shaft revolution.
- (vi) An angle valve is fitted at the outlet of the flowmeter to which a bleed valve is connected with a ¼" extension union to provide access for the measurement of LPG pressure at the meter. The outlet of this bleed valve has provision for sealing.
- (vii) A Tatsuno model VD-0206 spring-loaded pressure differential valve is fitted downstream of the flowmeter and is set to maintain the LPG pressure at the flowmeter at least 200 kPa above the vapour pressure of the supply tank.
- (viii) A Burkert model 136712K 12.7 mm solenoid-operated valve or compatible unit is fitted downstream of the pressure differential valve to control pressurisation of the system during the reset cycle and to control the delivery.
- (ix) A Parker model AD032B16T101 diaphragm hydraulic accumulator or compatible unit is fitted downstream of the solenoid-operated valve.
- (x) A UL/CGA Type 1 12.7 mm hose or any other compatible LPG hose is fitted downstream of the hydraulic accumulator, and an Elaflex Ark 19 breakaway coupling or any other compatible LPG breakaway coupling may be used.
- (xi) A ZVG model ZVG-1 LPG nozzle or any other NMI-approved compatible LPG nozzle (\*) may be used that is suitable for the PEC nozzle hang-up mechanism.
- (\*) Note that the submitter must be consulted regarding the acceptability of any alternative nozzles.
- (xii) The dispenser is provided with a recirculation line with a double check filler valve for returning the LPG back to the supply tank. The recirculation line is provided for maintenance and verification/certification purposes.

### 1.3 Calculator/Indicator

The calculator/indicator is comprised of a PEC model MHP computing module and indicator module (Figure 1). A separate LCD display is provided for volume, total price, and unit price. The indicator displays the following maximum values:

Volume 999.99 L in 0.01L increments

Unit price 999.9 ¢/L in 0.1 ¢ increments

Total price \$999.99 in \$0.01 increments

The bottom half of the unit price display can be configured to also indicate the flowmeter volume totals, up to a maximum of 99 999 999 L.

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

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

The calculator/indicator is approved with the version 2.xxx software.

The version number may be viewed using the set-up keypad (refer to the Test Procedure).

### 1.4 Totalisers (\*)

The instrument may be fitted with a 3 ENM Company model P2G729A 4.5 V DC electro-mechanical totaliser for indicating the volume totals in one litre graduations up to a maximum of 9 999 999 litres. The totaliser is located behind the indicator panel.

(\*) Refer to clause **1.3 Calculator/Indicator** re. the electronic totaliser.

### 1.5 Checking Facilities

Removing the nozzle from its receptacle initiates a segment check of the price, volume and unit price displays. The calculator/indicator checks for correct operation of various devices and displays an error message in the range 01 to 86, in particularly:

'ERR 24' –	Power failure
'ERR 38 to 43' –	Flowmeter pulse output error.
'ERR 80 to 85' –	Flowmeter pre-set over-run
'ERR 32 to 37' –	Excessive amounts of gas detected
'ERR 30' –	LPG temperature probe faulty
'ERR 59' –	LPG vapour sensed for a period longer than 1 minute
'ERR 58' –	LPG sensor failure

## 1.6 Volume Conversion Device

The volume conversion for density and temperature function is performed by the calculator/indicator in conjunction with the LPG Measurement model DSSG98 or model DSSG-2000 LPG monitoring device. The device comprises a probe located in the vapour eliminator interfaced to an integrated circuit board located in a separate unit. The probe senses LPG density, measures the temperature of the LPG, and detects if any vapour is present. The monitoring device incorporates the ASTM-IP-API *Petroleum Measurement Tables for Light Hydrocarbon Liquids*, metric edition, Table 54 and Table 53 for volume conversion within the approved field of operation.

## 1.7 Descriptive Markings and Notices

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

Pattern approval sign	NMI 10/1/26
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
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 to 570 kg/m <sup>3</sup>
Maximum liquid temperature ( $T_{max}$ )	50°C
Minimum liquid temperature ( $T_{min}$ )	-10°C
Environmental class	class C
Accuracy class	class 1.0

- (b) The minimum measured quantity ( $V_{min}$ ) shall be clearly visible on the indicating device of the instrument, in the form 'Minimum Delivery 2 L'.

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

## 1.8 Verification Provision

Provision is made for the application of a verification mark on the fuel dispenser.

## 1.9 Sealing Provision

Provision is made for sealing the mechanical calibration adjustment device on the flowmeters (Figure 3).

The flowmeter bleed valve has provision for sealing.

## 2. Description of Variant 1

Certain other models and configurations of the H9 series of LPG fuel dispensers as identified in Table 1.

TABLE 1

Meaning of model designations (in the form model H9221AN, the pattern):

Prefix and first digit	Series, namely H9 = 9000
Second digit	Body length, either 0 = 1.0 m body length 2 = 1.2 m body length 4 = 1.4 m body length
Third digit	Number of hoses, 1 or 2
Fourth digit	Hydraulic delivery system layout, either 1 = LPG module 92516 2 = reserve
Fifth digit	A = 1 product (LPG)
Sixth digit	Pre-set, either P = pre-set is fitted N = no pre-set fitted

### TEST PROCEDURE

Instruments should be tested in accordance with any relevant tests specified in the Uniform Test Procedures. Tests should be conducted in conjunction with any tests specified in the approval documentation for any components used.

#### Maximum Permissible Errors at Verification

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

The maximum permissible errors applied during a verification test of the fuel dispenser using the product for which it is to be verified, and from normal flow rate to the minimum flow rate are:

- ±0.6% for the calibration adjustment of the meter (\*); and
- ±1.0% for the complete measuring system (in-service inspection).



Other applicable maximum permissible errors are:

- ±0.5°C for the temperature measuring device;
- ±10 kg/m<sup>3</sup> for the density detection device;
- ±0.4% for the volume conversion to 15°C;
- ±40 mL for deliveries equal to the minimum measured quantity; and
- ±0.5% for gas elimination.

(\*) Adjusting the errors of a flowmeter to values OTHER than as close as practical to zero is forbidden, even when these values are within the maximum permissible errors.

### **Calibration**

The calibration adjustment of the flowmeter is carried out using the unconverted volume. The calibration adjustment of the flowmeter is achieved by adjusting the stroke of the pistons. Turning the calibration adjustment wheel clockwise will increase the error while turning the wheel anti-clockwise will decrease the error. One-pitch-turn varies the flow by 0.08% and the meter can be adjusted up to 0.64%.

The following steps are used to view temperature, density, unconverted volume, encoder constant and software version on the calculator/indicator:

- (a) Place the dispenser into function mode using the DIAGS switch (to SET) on the display PCB (and power cycling the dispenser if applicable).
- (b) 'FN-\_\_' will be displayed on the litres display.
- (c) Enter '08' followed by the 'Fill' button on the pre-set keypad to display the software version.
- (d) Enter '37' (Front) or '38' (Rear) followed by the 'Fill' button to view the uncompensated delivery value in the dollars display.
- (e) Use the 'Display Probe Temperature' function to view the probe temperature in the dollars display.
- (f) Use the 'Display LPG Correction Factor' function to view the LPG Correction factor in the dollars display.
- (g) Use the 'Display Specific Gravity' function to view the LPG Specific gravity in the dollars display.
- (h) Use the 'Display Encoder Constant' function to view the Encoder Constant in the dollars display.

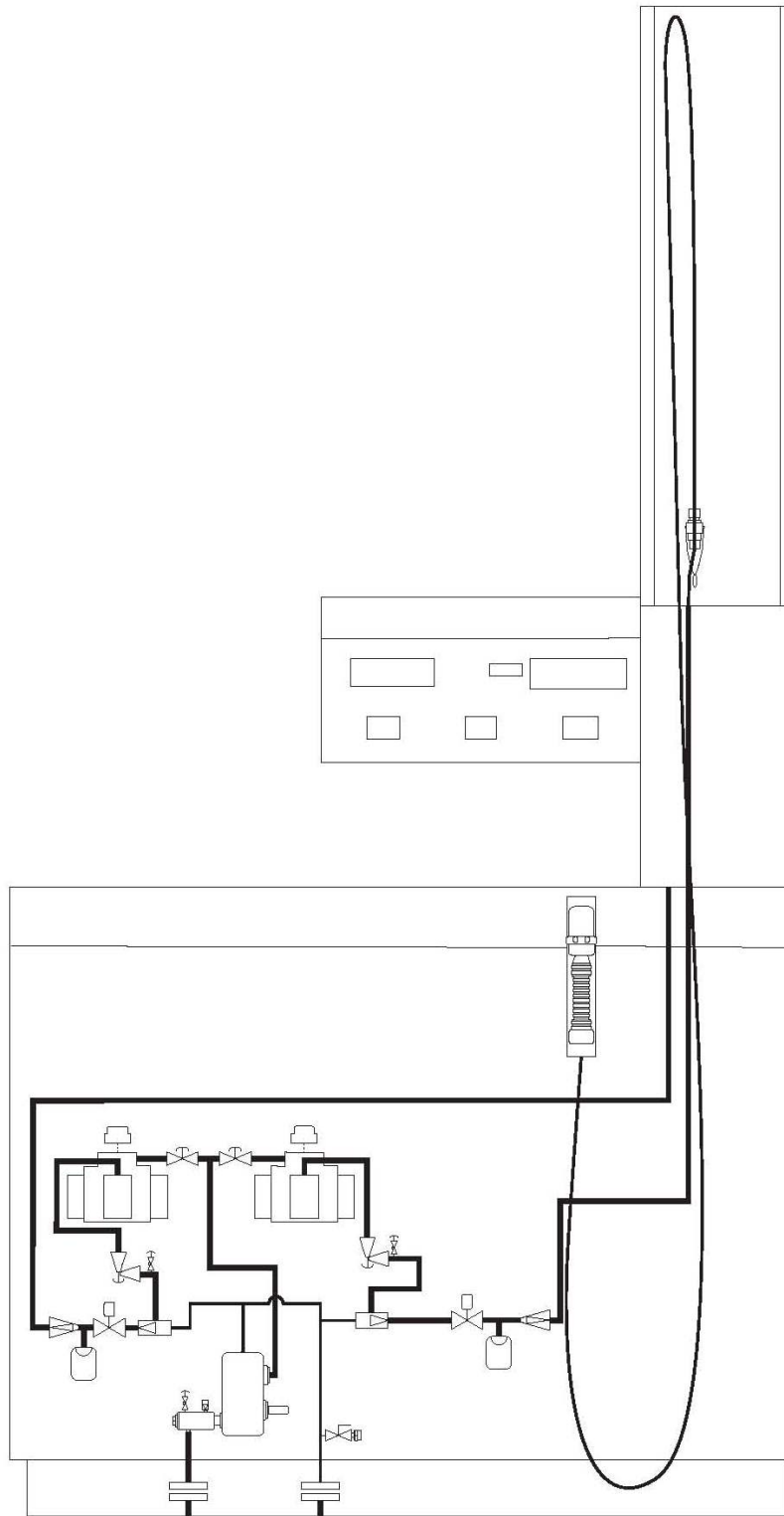
FIGURE 10/1/26 – 1



PEC Model H9221AN LPG Fuel Dispenser

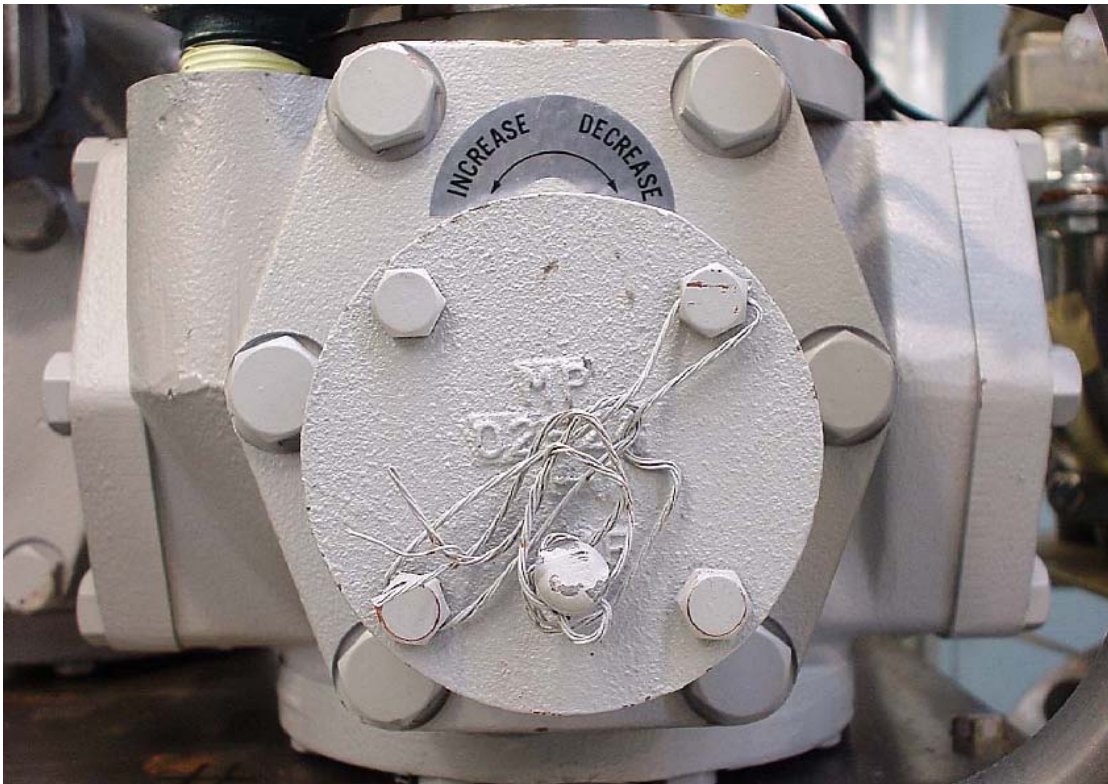
10/1/26  
3 March 2011

FIGURE 10/1/26 – 2



Typical Hydraulics – PEC Model H9221AN LPG Fuel Dispenser

FIGURE 10/1/26 – 3



Tatsuno Model MP02524 LPG Meter Including Typical Sealing Method