



LPG DISPENSER SERVICE MANUAL

LPG Dispenser Service Manual Version 1.0.6

Model: LASER: L-LPG, L-LPGD, LL-LPG

Date: 31 March 2017

Conditions of Use

- Read this manual completely before working on, or making adjustments to, the Compac equipment
- Compac Industries Limited accepts no liability for personal injury or property damage resulting from working on or adjusting the equipment incorrectly or without authorization.
- Along with any warnings, instructions, and procedures in this manual, you should also observe any other common sense procedures that are generally applicable to equipment of this type.
- Failure to comply with any warnings, instructions, procedures, or any other common sense procedures may result in injury, equipment damage, property damage, or poor performance of the Compac equipment
- The major hazard involved with operating the Compac C4000 processor is electrical shock. This hazard can be avoided if you adhere to the procedures in this manual and exercise all due care.
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Compac Industries Ltd.

52 Walls Road, Penrose, Auckland 1061, New Zealand.

PO Box 12 417, Penrose, Auckland 1642, New Zealand.

Tel: +64 9 579 2094 Fax: +64 9 579 0635 info@compacngv.com

www.compacngv.com



Product Identification

Specifications

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Models Covered This manual applies to Compac LPG Dispensers of the following models manufactured from 2015 onwards.
LASER L-LPG, L-LPGD, LL-LPG
NOTE: Do not use this manual for earlier models. Contact Compac for archived manuals if required.

Validity

Compac Industries Limited reserves the right to revise or change product specifications at any time. This publication describes the state of the product at the time of publication and may not reflect the product at all times in the past or in the future.

Manufactured By:

The Compac LPG V50 dispenser is designed and manufactured by Compac Industries Limited

52 Walls Road, Penrose, Auckland 1061, New Zealand

P.O. Box 12-417, Penrose, Auckland 1641, New Zealand

Phone: + 64 9 579 2094

Fax: + 64 9 579 0635

www.compac.co.nz

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Compac Industries Ltd.

52 Walls Road, Penrose, Auckland 1061, New Zealand.

PO Box 12 417, Penrose, Auckland 1642, New Zealand.

Tel: +64 9 579 2094 Fax: +64 9 579 0635 info@compacngv.com

www.compacngv.com



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Safety

DANGER

Do not attempt to work on LPG equipment without thorough knowledge and training. If unsure of exactly what you are doing, do not work on this equipment.

There are many dangerous traps when working on this equipment due to the nature of LPG. Please take note of safety precautions where they are given.

Failure to take adequate safety precautions could result in explosion, injury and loss of life.

Never smoke on any site where there is LPG. Make sure no person on the site is smoking.

If venting gas to change a filter or repair a component make sure no lights or possible sources of ignition are present. Make sure the vented gas can escape and dissipate.

PRECAUTIONS

Always follow safe operating procedures, any national or local regulations and site specific instructions.

Always turn the power off to the dispenser and properly isolate so power cannot be turned on by mistake.

Turn off isolating valves to the dispenser and degas before any mechanical servicing.

Pressure Relief Valves

A pressure relief valve is sometimes fitted so that if the pressure in the dispenser rises above 2,585kPa [375psi], vapour is relieved to atmosphere.

Keep clear of the valve when working on the dispenser as it may relieve pressure without warning.

Electrical Safety

Observe the following electrical precautions:

Always turn off the power to the Compac C4000 processor before opening the flame proof box. Never touch wiring or components inside the high voltage area with the power on.

Always turn off the power to the Compac C4000 processor at the mains switch before removing or replacing software or memory ICs.

Always take basic anti-static precautions when working on the electronics, i.e., wearing a wristband with an earth strap.

The C4000 head, and its associated circuits and wiring, is a certified piece of electrical equipment approved for use in a hazardous area (Class 1 Zone 1, Group IIA T3). Only parts identical to those covered by the certification may be used where the integrity of the intrinsic safety may be affected. All circuit boards are to be repaired only by Compac Industries Ltd.

Site Safety

When working on an LPG installation take the following minimum precautions:

Always make yourself familiar with all site safety precautions associated with servicing LPG equipment including national and local regulations and general precautions for dealing with flammable liquids and vapour. Obey all company regulations and site specific instructions relating to the installation.

Before working on any hydraulic equipment, degas the dispenser in an approved manner and ensure flammable vapour is not present.

Static Electricity Precautions

Electronic components used are sensitive to static. Please take anti-static precautions. All circuit boards must be carried and transported in static-shielded bags. An anti-static wrist strap should be worn and connected correctly when working on any electronic equipment. If an anti-static wrist strap is unavailable, or in an emergency, hold onto an earthed part of the pump/dispenser frame whilst working on the equipment. This is not a recommended alternative to wearing an anti-static wrist strap.

Compac Industries Limited reserves the right to refuse to accept any returned circuit boards if proper anti-static precautions have not been taken.

Installation

Refer to the LPG V50 Installation and Setup Instructions supplied with the dispenser and also available as a download from www.compac.co.nz.

Do not commence installation without the specific installation instructions for your unit. Some information is duplicated here to help with reconfiguration and calibration after part replacement or software upgrading.

Introduction to the Compac LPG V50 Dispenser

The Compac LPG dispenser is designed for safe, easy and trouble free dispensing of liquid petroleum gas (LPG). It is fitted with the revolutionary V50 Coriolis meter which gives improved flow, has no wearing parts and requires minimal servicing. It is controlled by the Compac C4000 processor which monitors all operating parameters to ensure correct metering and pricing.

Operating Parameters

Compac LPG Dispensers are designed to meter Propane, Iso-Butane and N-Butane as pure gases or mixtures in liquid form.

- The density range is from 480 – 580 kg/m³.
- The liquid temperature range is from –10°C to +50°C.
- Flow rate of 4 to 50 litres/min

The pump pressure. Measured at the dispenser, should be a minimum of 700kPa above tank vapour pressure at a flow rate of 30lpm. The maximum pressure should not exceed 2400kPa at the dispenser.

Approvals

Copies of Compac LPG Weights and Measures and Electrical Approvals are available from our web site at www.compac.co.nz. They can be viewed, downloaded and printed as .pdf files from our website.

Principals of Operation

Liquid LPG is pumped from an LPG tank either by a submersible pump or external pump. In the liquid feed line LPG vapour often occurs. To ensure accurate metering, the V50 LPG meter can detect vapour and will control the outlet solenoid to slow or prevent the flow of LPG until the increased line pressure causes the LPG to condense.

A check valve prevents LPG flowing back through the meter. The valve includes a pressure relief valve to relieve any excess pressure in the pipework.

A safety relief valve is sometimes fitted after the dispenser isolating valve. This relief is set to 26.25 bar [375psi / 2625kPa] and vents to atmosphere. In practice this relief never vents as the internal relief operates first. It is a safety for the hose in case the manual shut off valve is turned off while the hose is full of LPG.

Software Logic

When a site controller controls the dispenser and the nozzle is removed from the dispenser, or the start/stop button is pressed, the dispenser waits until it is authorised before commencing the following sequence to allow filling. If authorisation is not received from the controller the solenoids remain closed and the pump will not start. (If there is no site controller, the dispenser will commence the following sequence to allow filling when the nozzle is removed from the dispenser.)

The C4000 sends an output to the LPG Motor control to start the LPG pump and the display starts to go through the 88888's sequence.

During the 88888's sequence the V50 meter measures the density of the LPG. Once the density has been successfully measured, the display resets to 0.00 and filling can commence.

If the meter detects that the hose is unpressurised, the solenoids open in the following sequence:

- High (3 seconds)
- Low (3 seconds)
- High and Low

But if the meter detects that the hose is already pressurised, the sequence is:

- Low (3 seconds)
- High and Low

On preset dispensers, the C4000 will control the solenoid to reduce the flow rate before the preset amount is reached. If required, this figure is able to be changed. Refer to Preset Cut-Off.

At the end of the fill the C4000 motor output turns off and the solenoid closes.

Under normal conditions, to end a transaction on a C4000 controlled pump/dispenser, there are five possibilities:

- Flow rate drops below 4 litres per minute for ten seconds.
- Returning the nozzle to its holder.
- Reaching the preset amount entered.
- The site controller terminates the fill.
- The Stop Button is pressed.

Whichever event happens first will terminate the sale.

20 seconds after the fill finishes (i.e. flow stops and the solenoid closes), the display will flash HANG NOZZLE until the LPG nozzle is hung up.

Dispenser Totals

As well as having electromechanical totes for storing the total number of litres dispensed from each hose, the C4000 stores these totals in its memory. These totals cannot be reset.

These totals can be displayed by pressing the CLEAR button on the preset keypad five times in quick succession.

The totals will then appear on the pump displays, on the LITRES and DOLLARS display, for ten seconds before the display resets.

In the absence of a preset keypad, remove the nozzle from the nozzle holder. Hold the nozzle switch or start/stop button down for at least three seconds and then tap it in five times in quick succession. The totals will then appear as described above.

NOTE: *the electronic total for litres is displayed as 5 digits and the electronic total for dollar value is displayed as six digits. Therefore the display will roll over and start again at zero once the total reaches 99.999 litres or 999.999 dollars.*

Electronics

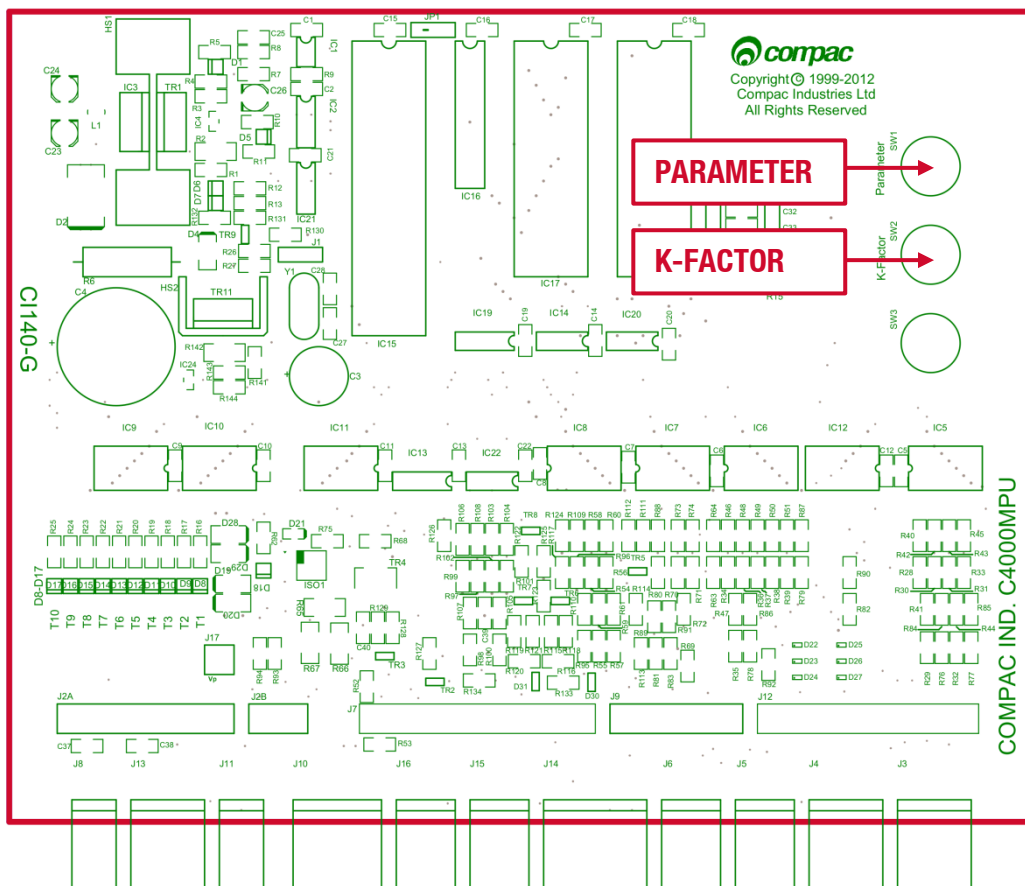
C4000 Processor

The Compac C4000 is a microprocessor-based circuit board designed for use in liquid and gaseous fuel metering. One C4000 head is used for a single or dual LPG dispenser. The C4000 accepts inputs from the V50 meter. It converts the V50 meter output to litres, which are corrected to litres at 15°C and displayed with the price and total of the sale on the retail LCD display.

NOTE: wait at least 30 seconds from powering up the C4000 before starting a fill. Failure to do this will result in a "density" error.

The parameter and K-Factor switches are used to configure the dispenser's C4000 processor. Changes made can affect how the dispenser operates and can result in it becoming inoperable. Only make changes when you understand what you are changing.

The parameter and K-Factor switches are located on the C4000 board, which is in the dispenser cabinet and covered by a metal panel. The K-Factor switch is sealed to prevent tampering.



K-Factor Settings

To access the K-Factor settings, unseal the K-Factor switch and press repeatedly, this will open the settings in the table below. Continuing to press the K-Factor switch will scroll through each digit of each of the settings until the Configuration Code setting is reached.

To go back to a previous setting, you must wait 10 seconds for the menu to timeout, and start again.

| Setting | Price Display | Litres Display |
|--------------------|-----------------|------------------|
| Display Resolution | 'Sr' | 'Sr0/0.00/0.000' |
| Solenoid Delay | 'Sd' | 'dXXX' |
| Preset Cut-Off | 'PCut' | 'PCXXX' |
| K Factor | 'F/Fb/F1/F2/F3' | 'XXXXX' |
| Meter A ID | 'id-A' | 'XXXXXX' |
| Meter B ID | 'id-b' | 'XXXXXX' |
| Hose | 'HOSE' | 'XXX' |
| Density | 'd15-A' | 'XXXX' |
| Temperature | 'E-A' | 'XXX' |
| Line Delay | 'Ld' | 'LdXXX' |
| Configuration Code | 'C' | 'XXXXX' |

To change the value of a selected digit, hold down the K-Factor switch. This will cause the digit to cycle through (0,9). Releasing the K-Factor switch will select the digit.

The K-Factor switch must be resealed after use to prevent unauthorised access.

NOTE: before altering any K-Factor switch settings, ensure the nozzles are hung up, and the dispenser is idle.

Display Resolution

The Display Resolution setting sets the maximum amount of LPG per transaction. This prevents the transaction cycling back to zero when the display resolution is exceeded by the dispensed volume.

No-Flow Cut-Off

The no flow cut off time is the period from when flow of product starts, to when the dispenser terminates the sale. This time period is fixed at 10 seconds. (LPG software only) It is **NOT** able to be adjusted.

Therefore, if the nozzle trigger is released for more than 10 seconds during a fill, the dispenser will automatically terminate the sale.

To end a transaction on a C4000 controlled LPG dispenser, there are five possibilities:

- Flow rate drops below 4 litres per minute.
- Returning the nozzle to its holder.
- Nozzle trigger released for more than 10 seconds after fill has commenced.
- Reaching the preset amount entered.
- The site controller terminates the fill.
- Pressing the Stop Button.

Which ever happens first terminates the sale.

Solenoid Delay

The Solenoid Delay is installed in the program to enable a delay between the remote pump starting and the dispenser solenoids opening.

This setting should never be set more than 4-6 seconds and the default setting is 0000 (i.e., no delay).

Its main purpose is to allow the leak detector on the submersible pump to carry out its leak test.

Preset Cut-Off

Prior to the dispenser reaching its preset amount, the solenoids are switched to give a low flow rate to prevent overrunning the preset amount. The “preset cut-off” sets the amount (in litres), prior to the preset amount being reached, at which the solenoids will switch to a low flow rate.

If you are experiencing overruns, use the following calculation to adjust the P-cut figure: [Price per Litre] X [over-run (displayed as a dollar value)] + existing P-cut figure

NOTE: *If the high flow solenoid is cutting off a long time before the preset figure is reached*

resulting in slow filling, the P-cut number can be adjusted down until an over run is achieved then the above calculation used to fine tune it.

To set the P-cut:

- Hang up the LPG nozzle after doing a test fill.
- Press the K factor switch until you get to the P-cut display
- Press the K-Factor switch until you reach the digit you want to change and hold the K-Factor switch to scroll. When the correct digit is reached release the switch.
- Press and hold the switch again and the next digit will scroll. When the correct number is reached release the switch.
- Continue this procedure until the correct P-Cut figure is entered.
- Do another preset fill to check the preset stops at the correct price.

For two hose LPG dispensers the P-Cut figure controls both hoses.

Temperature

Adjusts the temperature setting of the meter. This calibrates the Meter's temperature probe so that the meter can accurately calculate the dispensed volume from its density and mass readings.

To set temperature offset:

- Using the K-Factor switch, scroll through until the top line of the display reads E-A. The line below shows the compensated temperature reading and the \$/Litre display shows the temperature the meter is reading in degrees C.
- Use the K-Factor switch to change the compensated temperature to the desired temperature offset.

For a two hose model, perform the same operation for side B.

Density

Adjusts the density setting of the meter. This is the density of the site's LPG at 15°C and is used by the meter, in conjunction with its temperature and mass readings, to calculate the volume of LPG dispensed in litres.

To set the density offset:

- Using the K-Factor switch, scroll through until the top line of the display reads d15-A. The line below shows the compensated density reading and the \$/Litre display shows the density the meter is reading.
- Use the K-Factor switch to change the displayed compensated density to the desired density offset.

For a two hose model, perform the same operation for side B.

K Factor

Adjusts the calibration factor of the meter. This allows the meter to correctly measure the mass of LPG flowing through it. This is then converted to volume of LPG, in litres, using temperature and density.

To set the K-Factor:

- Press the K factor switch once and release. The display will show FXXXXX if the dispenser is a single and FAXXXXX if the dispenser is a dual. XXXXX is the default factory K-Factor setting for LPG.
- Repeatedly press the K-Factor switch until you reach the digit you want to change and hold the K-Factor switch in to scroll. When the correct digit is reached release the switch.
- Press and hold the switch again and the next digit will scroll. When the correct number is reached release the switch.
- Continue this procedure until the correct K-Factor is entered.

Meter ID

Pairs the meter to the ModBus C4000 board. This will have to be changed whenever the V50 meter is replaced.

Hose

The Hose setting is used to set the volume of LPG contained in the hose. This prevents the meter from measuring the liquid used to pressurise the hose before the customer opens the nozzle valve.

Line Delay

Where LPG pumps are sited some distance from a dispenser, the LPG in the supply line will vaporise over time leading to density errors when the pump is used infrequently.

The line delay (Ld) setting delays the opening of the solenoid by up to 99 seconds to allow the pump to bring the LPG supply line up to a pressure that will condense the gas.

To prevent long delays when the pump is in more frequent use, the software records the time between fills and applies a proportion of the maximum set delay up to a maximum of 8 hours idle time. When there is less time between fills, the software proportionally reduces the delay.

For example: If the Ld is set to 60 seconds, after 8 or more hours of idle time the delay will be 1 minute, after 4 hours idle time the delay will be 30 seconds, after 2 hours of idle time the delay will be 15 seconds. When the calculated idle time is less than 3 seconds, the line delay is ignored and the dispenser will just do a density check before engaging the solenoids to start a fill.

While the dispenser is in line delay mode, the display will read “Ready in XX”. The “XX” value will count down in seconds to the density check.

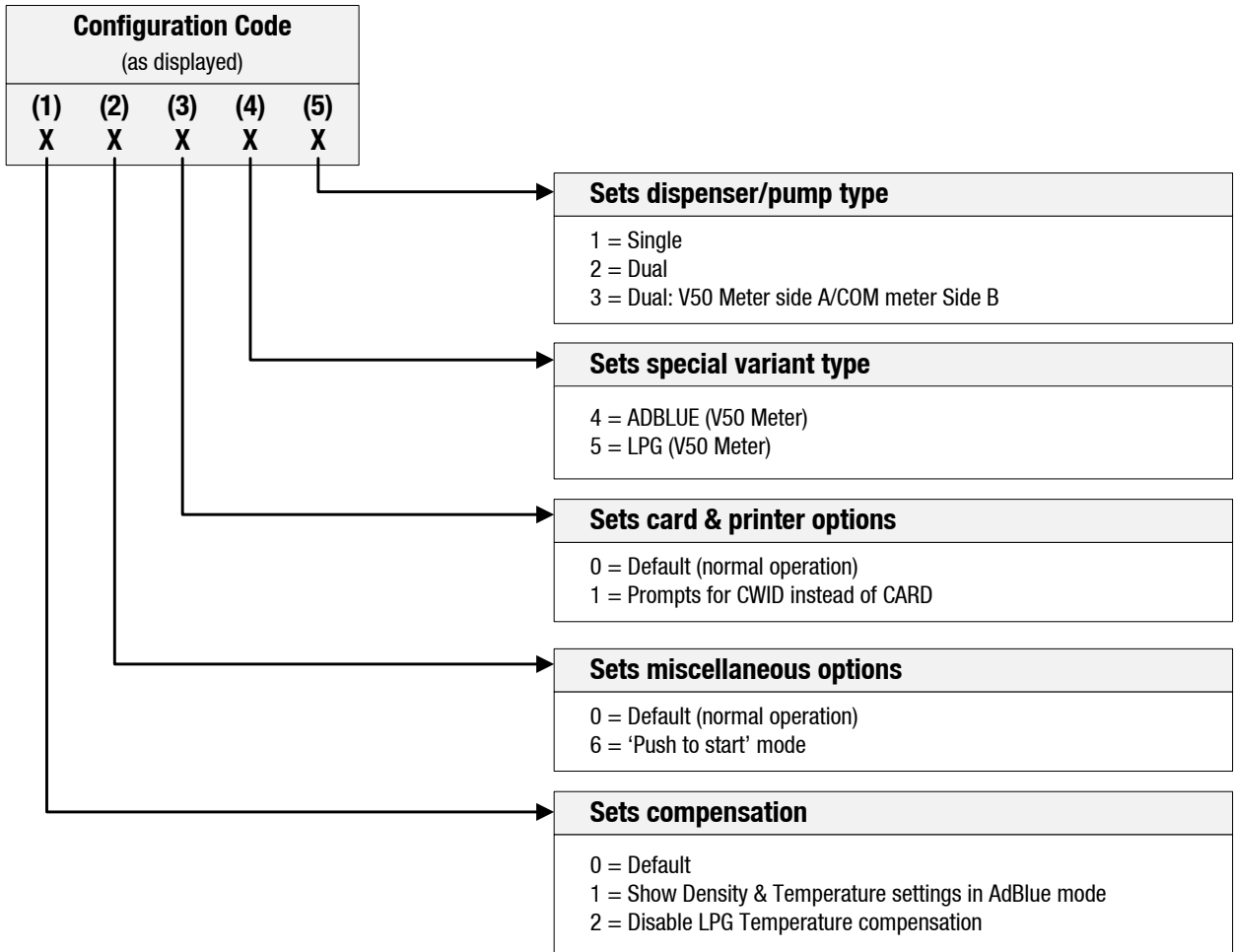
NOTE: When the pump is repowered, the line delay will be reset to the maximum set Ld value for the first use.

If you are experiencing “density” or “gas” errors when the dispenser has been used infrequently, you will need to increase the line delay setting. Use the K-Factor switch to select the Ld setting. While setting this value, the price display will indicate Ld XX where X equals one second.

Finding your optimum setting is a matter of trial and error. If the dispenser is being used frequently during the day and you only get a density or gas error on the first use in the morning, a large Ld setting (60–90 seconds) will only hold up the first user of the day but will greatly reduce the chance of an error. If the dispenser is close to the pump and is only used every few hours or depowered between use, the Ld setting can be made smaller or set to zero (factory setting) to minimise the delay before the dispenser starts.

Configuration Code

Changes the software for the number of hoses and fuel type. If changing a C4000 processor board this must be set first. The diagram below shows possible configurations.



Parameter Settings

When the Parameter switch is pressed once, the system enters a diagnostic mode, whereby it displays the program type data and performs a display segment test. When showing program data, the display panel shows 'PXX' where 'XX' is the program version number.

When the Parameter switch is pressed repeatedly the settings in the table below will be opened. Continuing to press the Parameter switch will scroll through each digit of each of the settings, and loop around to the beginning once the end is reached.

The C4000 will timeout if left idle for 10 seconds. This will reset the menu.

| Setting | Price Display | Litres Display | Unit Price Display |
|------------------------|---------------|----------------|--------------------|
| Price | 'Pr-A' | 'PXXXX' | |
| Pump Number | | 'PnAXX' | Last End Sale |
| Last Fill | Last Litres | Last Density | Last temperature |
| b Configuration | 'b' | 'bXXXX' | |

To change the value of a selected digit, hold down the Parameter switch. This will cause the digit to cycle through (0, 9). Releasing the Parameter switch will select the digit.

NOTE: before altering any Parameter switch settings, ensure the nozzles are hung up, and the dispenser is idle.

Price

Sets the price/litre of LPG that the dispenser displays. This is almost always done remotely through a site controller, but can be done manually at the dispenser by setting PXXXX to the desired price/litre.

NOTE: the LPG dispenser will not allow the price/litre to be altered during a delivery. When the price/litre is altered, the LPG dispenser will display the new price/litre for at least 5 seconds before allowing a new transaction to begin.

Pump Number

This must be set at the dispenser for each hose, so that communications with a controller can take place. To set the pump number:

- Press the Parameter switch repeatedly until PnAXX appears in the litres display window.
- Press and hold the Parameter switch to increment the pump number. The switch should be released when the desired dispenser number is displayed. The value of the displayed number will then be stored in the C4000 memory as the dispenser number for that hose.
- When the switch is pressed again PnbXX will appear on the display.

These two options will toggle each time the switch is pressed.

The end of sale indicator is displayed in the unit/price display.

NOTE: For a single hose only PnXX will be displayed.

Last Fill

Displays the uncompensated values of the last delivery.

The uncompensated volume is the actual metered volume and is displayed in the litres display.

The displayed density is the density (kg/m^3), corrected to 15°C , read at the start of the delivery (or more precisely, at the end of the previous delivery). It is displayed on the price display in kg/m^3 .

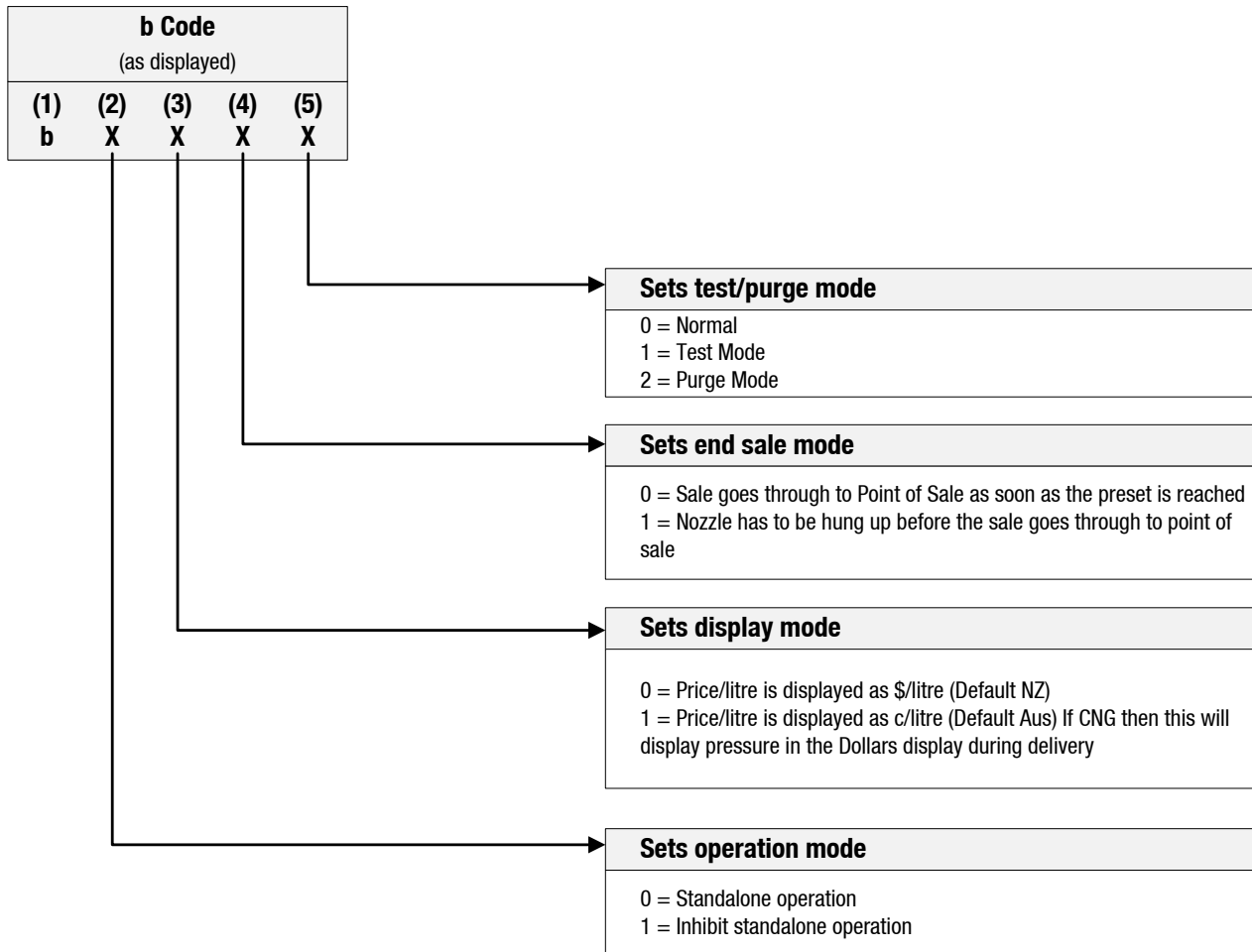
The displayed temperature is the last temperature reading during the delivery. It is displayed on the unit price display in degrees Celsius.

NOTE: manually calculating the corrected volume from the uncompensated volume, using the displayed temperature and density, will only be accurate if the temperature and density did not change during the delivery.

b Configuration

The b Configuration code controls several programmed options for the dispenser.

NOTE: the correct b Code for the unit is printed on a yellow label on the C4000 board cover.



Purge Mode

For purge mode, set the last digit of the b configuration code to 2 (XXX2). This allows the lines to be purged of air without the meter registering an error and closing the solenoids. The display will read "Purge On".

Test Mode

For test mode, set the last digit of the b configuration code to 1 (XXX1), this will display density in the unit price display to allow the user to see what the meter is reading. Otherwise the dispenser operates normally.

Operation Mode

In standalone operation, the dispenser will continue working when not connected to a site controller. 'Stand-alone' mode requires no authorisation and a fill is initiated by removing the nozzle from its holder. If standalone operation is inhibited, the dispenser must receive authorisation from a controller in order to work.

Generally on retail sites the dispenser should be set-up for standalone operation. If the site controller breaks down the dispensers can be set to work in 'stand-alone' mode simply by turning them off then on again. In 'stand-alone' operation, if the controller comes online, it will automatically resume controlling the dispenser.

For unattended refueling sites, the dispensers should be set up to inhibit standalone operation in the event of a controller failure. The 'b' code to inhibit 'stand-alone' is 1XXX.

End Sale Mode

Sets the action that ends the transaction. The dispenser can end a transaction when the preset is reached, or when the nozzle is hung up.

Display Mode

Sets whether the dispenser display the price/litre as cents/litre or dollars/litre. This option is specific to countries which use dollars, where the convention is to display the price in cents.

Software Upgrade Procedure

Ensure, before working on the pump, that anti-static precautions are taken (i.e. wearing of wristband with earth strap).

Gain access to C4000 Processor Board and record all set-up data by accessing the configuration (K-Factor) switch and the parameter switch, this includes recording the comms dipswitch settings.

The above step is taken to safeguard against software incompatibility causing loss of information.

- Turn off power.
- Remove software EPROM (removable chip labelled C4000 PXX or XX-X-XX:XX.X) using an EPROM extractor.
- Plug in new software EPROM, being careful that the dimple is at the correct end of the socket (i.e. software chip dimple to base dimple). Also that all the legs are correctly located in the socket (i.e. two socket holes are left above the dimple).
- Turn on power.
- Check that the data recorded in Steps 2 and 4 is still present, if not re-enter.
- Check the electronic totals, if not as before then give 'before' and 'after' totals to relevant people on site.
- Ensure that the status of cards/pins/keys, on 'Comcard', 'Compin', or CWIDKey systems, is as before. If they are different in any way, ensure that the relevant people on site receive 'before' and 'after' printouts of card/pin/key totals.
- Test dispenser operation.

CAUTION

When replacing Integrated Circuit chips, ensure that the notch is facing in the direction of the IC board socket (the notch is the end that we refer to as the "front").

When inserting the IC chip, the rear pin (of the IC chip) must be plugged into the rear pin socket of the IC board socket. Any spare pin sockets should be in front.

Failure to correctly insert the IC chips or adhere to the above guidelines specified herein will result in a loss of memory data.

Diagnostics

Indicator LEDs

Power LED

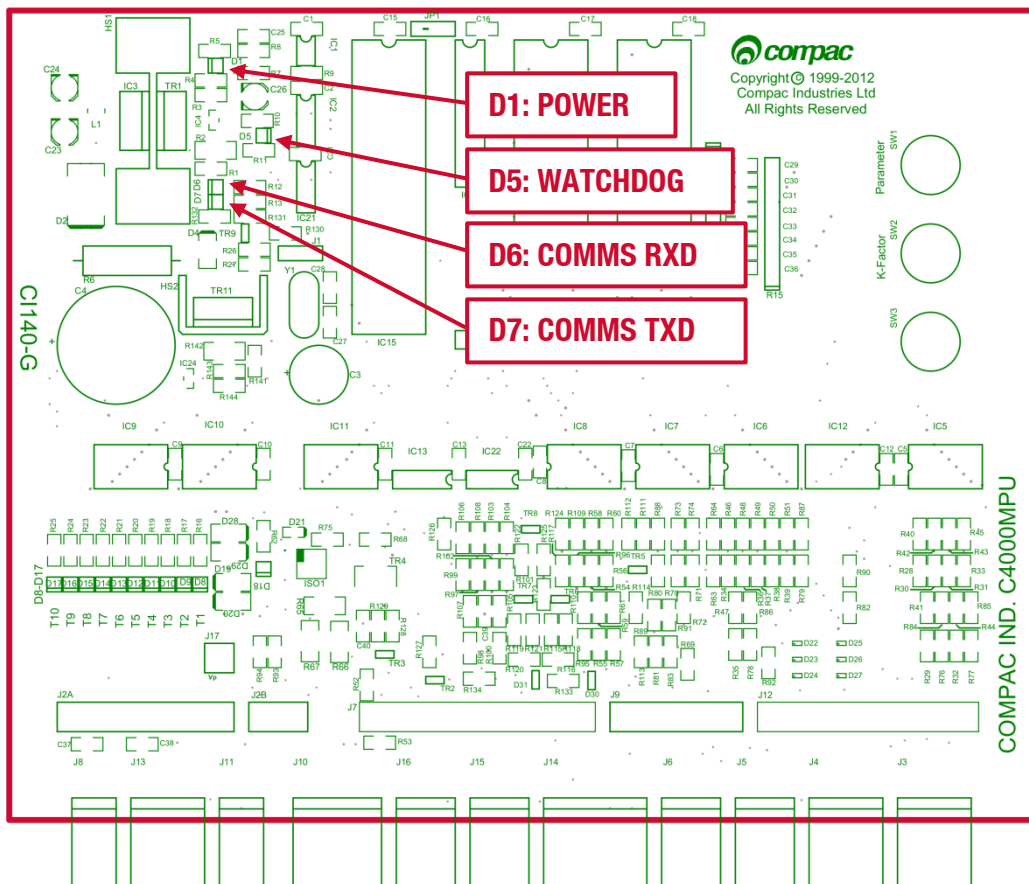
The Power LED lights when the processor board has power. If this LED flashes, this indicates that the processor has a fault on the processor power supply.

Watchdog LED

The Watchdog LED lights only if the watchdog circuit has been triggered, thereby indicating that a processor fault has occurred.

TXD & RXD LEDs

The TXD and RXD LEDs indicate polling of communications to/from a controller. The RXD LED flashes whenever any communications polling is received and the TXD LED flashes whenever the C4000 processor responds to polls for its respective pump number(s).



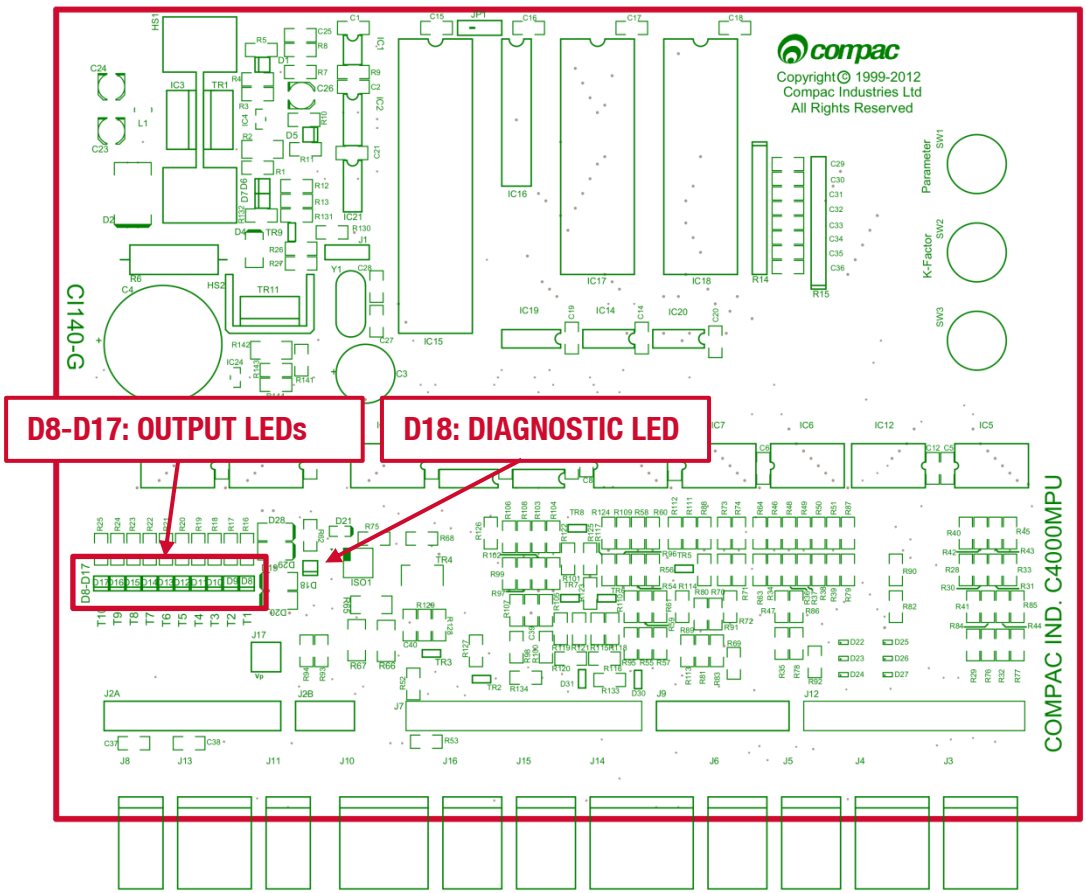
Output LEDs

The ten Output LEDs indicate which triac outputs are being switched on. D8-D17 corresponds to the output triacs T1-T10.

Diagnostic LED

The Diagnostic LED flashes in three different states when the processor is working properly:

- When the pump is idle and in 'stand-alone' mode, the LED flashes slowly and consistently.
- When the pump is idle and communicating with a controller the LED flashes slowly but erratically.
- When the nozzle is lifted from its holster, the LED flashes quickly.



Hydraulic System

The Hydraulic system is designed for a maximum working pressure of 2,400 kPa.

From the inlet, LPG flows into the manifold block. A vapour release line with a check valve bleeds any vapour back to the tank. Liquid LPG flows through the V50 Coriolis meter then through a reverse flow check valve and a strainer. A high/low flow solenoid valve controls the flow of LPG if the V50 meter detects vapour, the solenoid controls the flow of LPG to raise the pressure and condense any vapour. From the solenoid the LPG passes through an isolating valve, through an excess flow valve to the refuelling hose, LPG breakaway and LPG Nozzle.

On models with a preset fill value option the solenoid is switched to achieve a low flow rate shortly before the preset amount. (Refer to P-cut setting on the K factor switch).

| Component | Function |
|-------------------------------|---|
| LPG vapour return line | Bleeds vapour back to the LPG tank. A check valve prevents reverse flow. At the flange, a socket is fitted to allow a Master Meter to send LPG back to the tank during calibration. |
| Manifold | Contains a thermowell to allow temperature readings to be taken during calibration. |
| V50 Meter | Meters the flow of LPG. Also measures LPG density and temperature and detects vapour. |
| Check Valve | Prevents reverse flow back through the meter. The valve also has an internal pressure relief valve that prevents excess pressure build up in the outlet lines. |
| Strainer | Stainless steel mesh strainer to remove debris before the solenoid valve. |
| Solenoid | Provides on/off and flow control over the LPG through the dispenser. |
| Manual Shut-Off Valve | Installed to minimise the discharge of LPG to atmosphere when replacing the hose. |
| Pressure relief valve | A pressure relief valve is fitted so that if the pressure in the dispenser rises above 2,585kPa [375psi] then vapour is relieved to atmosphere. In normal circumstances the internal relief valve in the check valve will release pressure before this valve opens. |
| Excess Flow Valve | Reduces the flow through the dispenser if the hose ruptures. (The meter will also close the solenoid valve if excess flow detected.) |
| Breakaway | Fitted to the hose to allow a vehicle to accidentally drive off with the hose still attached to the vehicle without damaging the LPG dispenser. |

Typical Cycle

The following describes a typical hydraulic cycle.

| Operator Action | What Happens at the Dispenser |
|--|--|
| If NO Preset is Fitted: | |
| Lift the nozzle/press start button. | If there is no site controller, the C4000 activates the LPG pump and the main solenoid. The solenoid opens to condense any vapour in the refuelling hose. The display takes 3 seconds to go through the 88888's. The display then resets and the fill commences. If there is a site controller the LPG dispenser must be off hold before the nozzle is lifted. The nozzle must be hung up for 3 seconds before lifting and placing in the vehicle. |
| Nozzle attached to vehicle. | LPG flows through the dispenser and is metered. |
| Flow stops and the nozzle is hung up. | The solenoid closes and pump stops 10 seconds after the fill has ended. |
| If a Standard Preset is Fitted: | |
| Press the sale value required on the preset pad. | The preset amount appears on the Preset Display |
| Lift the nozzle/press start button. | If there is no site controller the C4000 activates the LPG pump and the main solenoid. The solenoid opens to condense any vapour in the refuelling hose. The display takes 3 seconds to go through the 88888's. The display then resets and the fill commences. If there is a site controller the LPG dispenser must be off hold before the nozzle is lifted. The nozzle must be hung up for 3 seconds before lifting and placing in the vehicle. |
| Nozzle attached to vehicle. | LPG flows through the dispenser and is metered. |
| Flow stops either on the preset or the vehicle tank is full. | On preset dispensers, before the preset amount is reached, the high flow coil on the solenoid switches off to reduce flow. At the preset amount, the low flow solenoid is switched off and power is turned off to the pump. The amount this occurs at can be changed using the P-cut feature on the C4000. |
| The nozzle is hung up. | The sale at the site controller is terminated. |

Safety Features

| Situation | Feature | How it Works |
|---|---------------------------------|--|
| Drive away with the nozzle attached to the vehicle. | Inline Breakaway | The Breakaway separates and the vehicle drives away with some of the hose attached to the vehicle. Flow is stopped from both ends of the hose. The Breakaway can be reassembled without tools. |
| Hose ruptures | Excess Flow Valve | If the LPG Hose Ruptures the Excess Flow Valve will shut at 80 lpm and reduce the flow to 2–3 litres per minute. The meter will also detect excess flow and close the solenoid valve. |
| Vehicle Crashes into a Dispenser and the under Pump Valve is not tripped. | Excess Speed | If the meter registers more than 60 lpm then the solenoids are turned off and pump motor stopped. |
| Pressure builds up in the LPG Hose on a hot day during a period of non-use. | Internal Relief Valve | In the meter manifold is a check valve with an internal relief valve. This vents excess pressure back to the tank. |
| Tank and Dispenser excess Pressure | Pressure Relief Valve. | A pressure relief valve is fitted so that if the pressure in the dispenser rises above 2,585kPa [375psi] then vapour is relieved to atmosphere. |
| The nozzle switch is left open while there is no flow. | No flow time out of 30 seconds. | The solenoids and pump motor are turned off after the stated time. This is settable from 0-254 seconds at commissioning. It is normally set to 30 seconds. |

Emergency Shutoff Button:**Air Actuated:**

An optional Air Actuated Emergency Shut Off Button may be located on the side of the LPG dispenser. In the case of an emergency **PRESS THE BUTTON IN**. The air supply to the actuated shut off valves under the dispenser will be cut, the air on the air actuated valves vented and the valves will close.

To reopen the air actuated valves under the dispenser, the Emergency Shut Off Button must be twisted a ¼ turn clockwise. The button will pop out and restore air to the valves for them to open.

Electrical:

An optional Electrical Emergency Shut Off Button may be located on the side of the LPG dispenser. In the case of an emergency **PRESS THE BUTTON IN**. The power to the triacs will be cut, shutting down the pump(s) and the solenoid(s). The dispenser will remain powered up. Reset by pulling the button out.

This option can also be wired into a remote site emergency stop circuit that will stop the dispenser when the circuit is opened.

V50 Meter

Specifications

The Compac V50 meter is used to measure the litres flow of the LPG. The V50 is a Coriolis meter designed to operate under the following conditions:

- Suitable Products: LPG
- Flowrate: 4 - 50 litres per minute
- Rated Working Pressure: 25 Bar
- Test Pressure: 85 Bar
- Design Working Temperature: -25°C to +55°C
- Inlet & Outlet Connections: Compac manifold block
- Seals: One inlet and one outlet O-ring.

Features

- The meter is very simple with no moving parts
- Measures temperature and fuel density to ensure greater accuracy
- There is no flow restriction
- The Compac V50 meter is intrinsically safe for Zone 0 and Zone 1 applications when powered by Compac electronics or suitably approved electronics.

LPG Solenoid

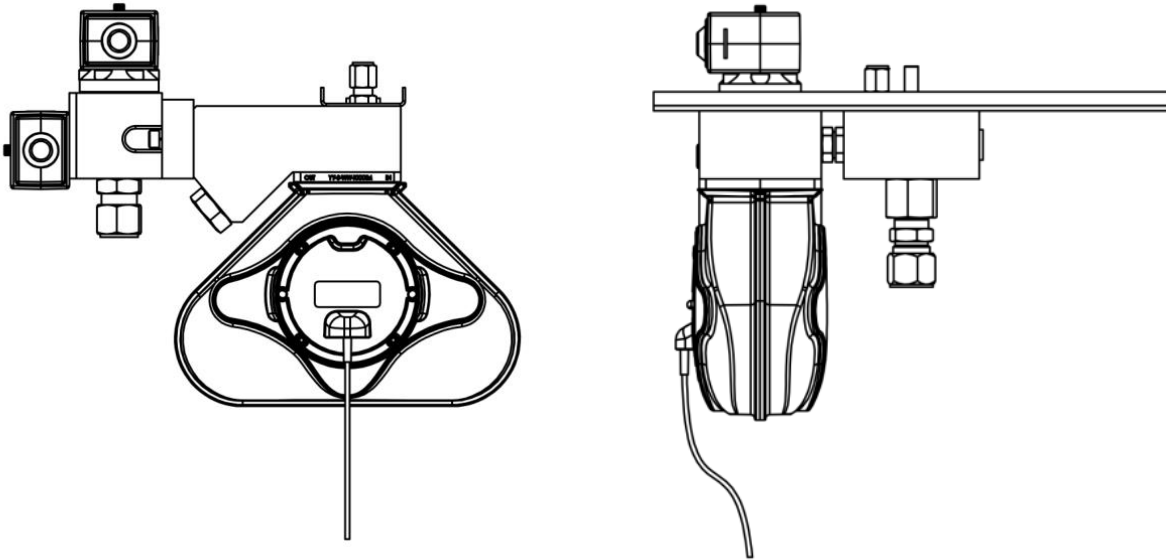
Specifications

Compac's two stage LPG solenoid is designed to control the flow of LPG through the dispenser under the following conditions:

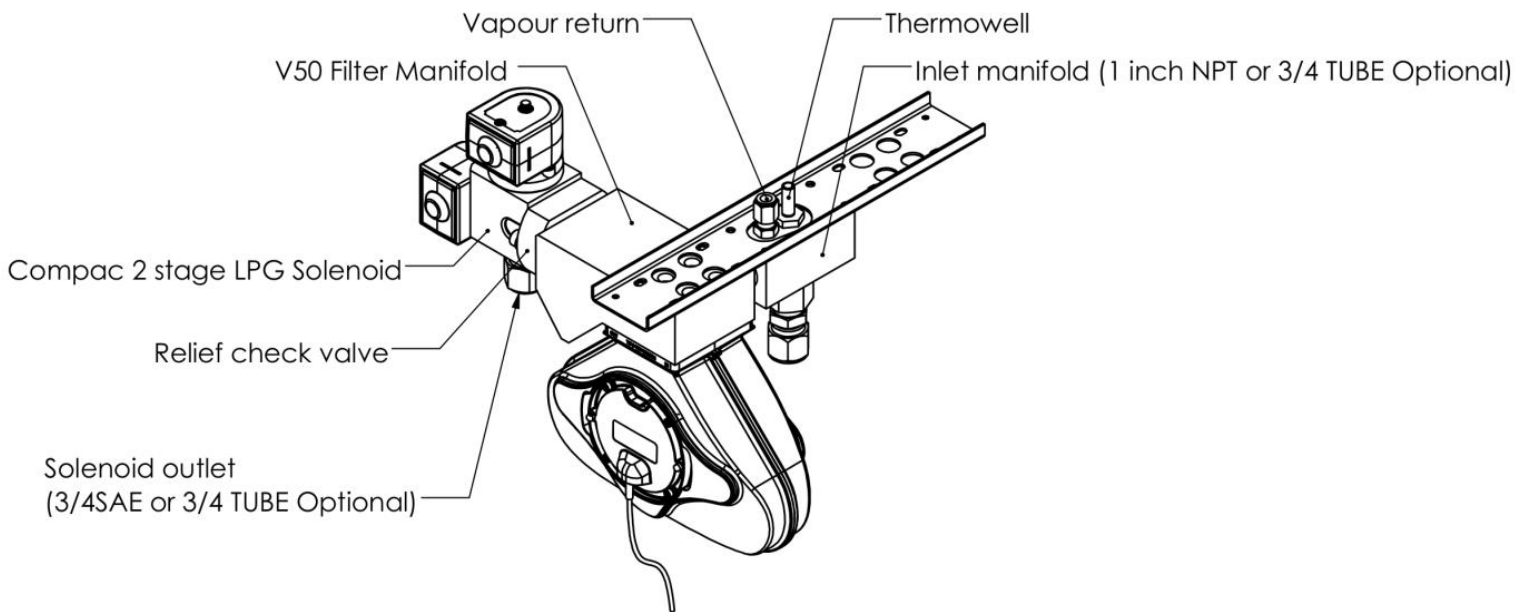
- Working pressure: 0-26 Bar
- Ambient temperature range: -25 to +55 °C
- Body: Aluminium
- Flow Coefficient Kv (m³/h): 2.7
- Flow Coefficient Kv (l/min): 45
- Inlet port: OVAL flange - 70mm PCD
- Outlet port: SAE-8 (3/4-16)
- Internal relief pressure differential: 8 Bar

Hydraulic Layout

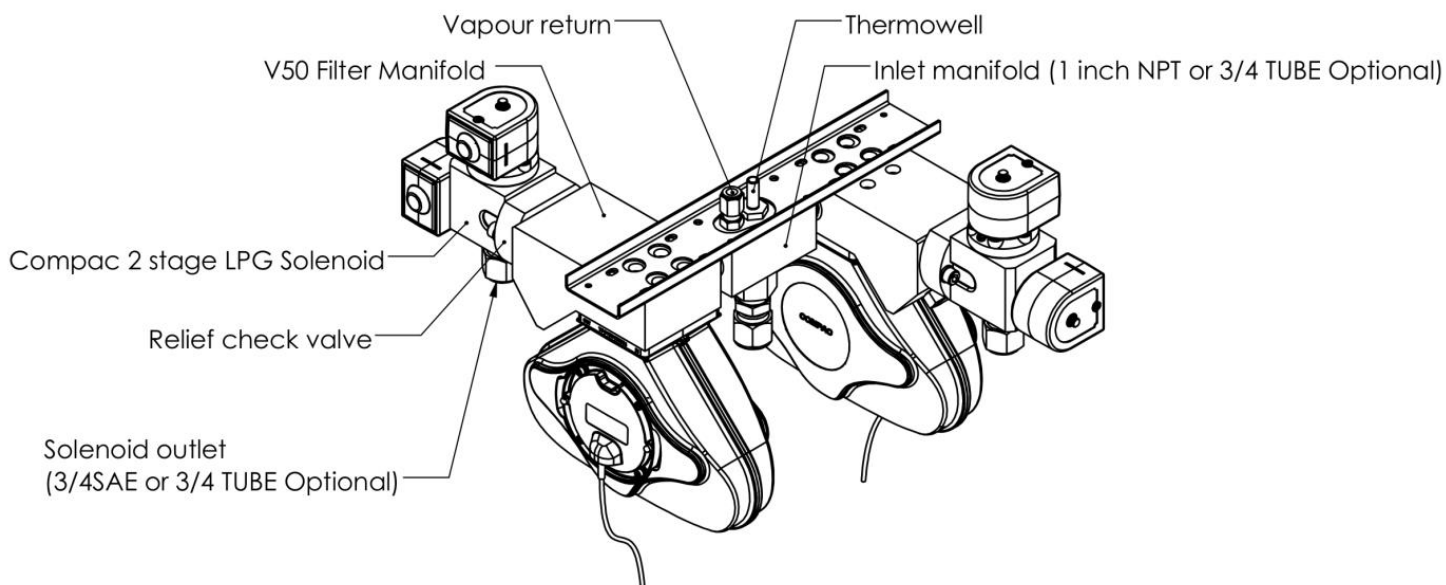
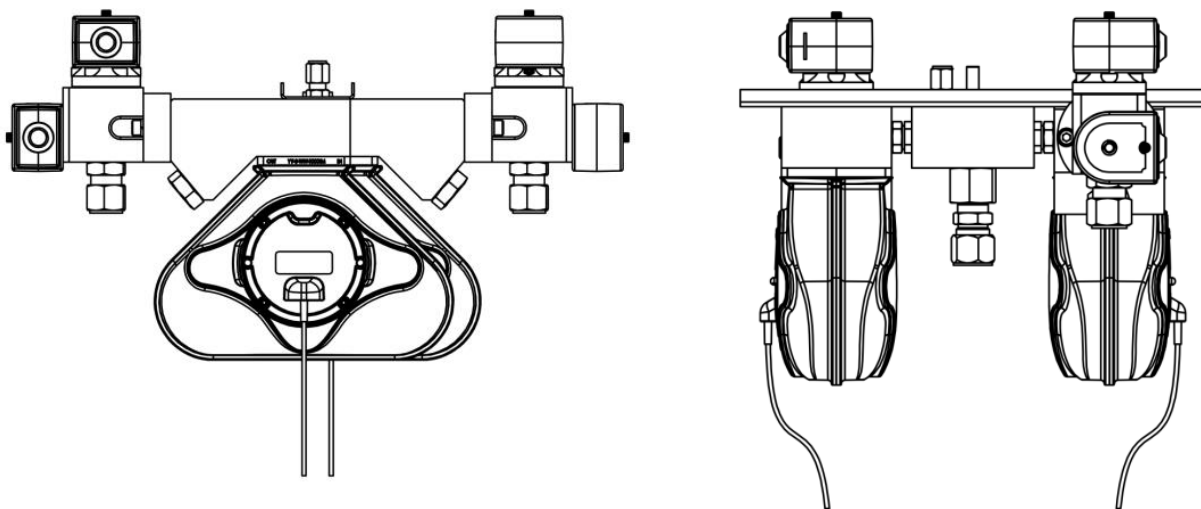
Single V50



HYDRAULICS



Dual V50

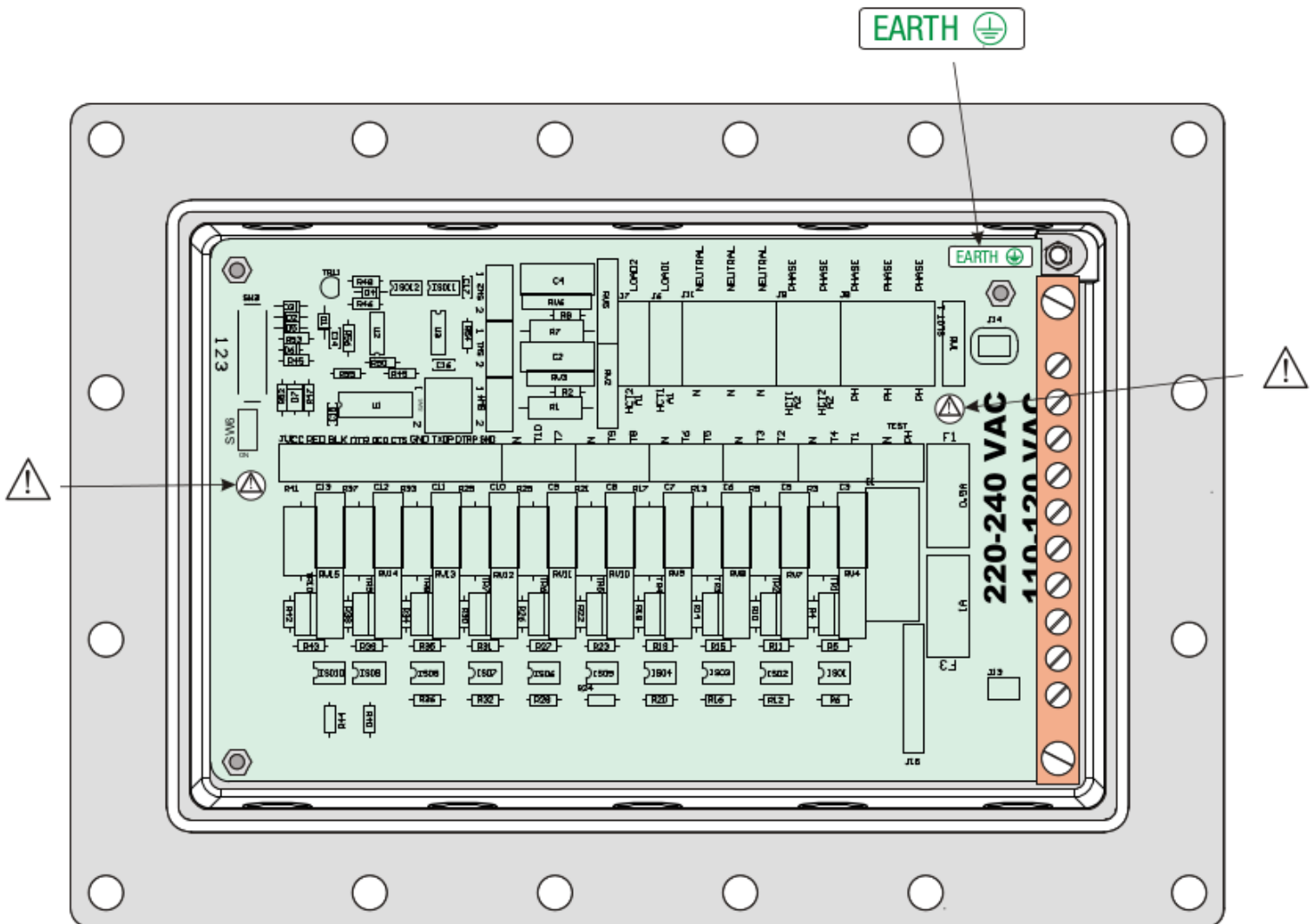


Electrical System

C4000 Power Supply

The Compac C4000 power supply:

- Is suitable for use in Class I Zone 1 hazardous locations and provides outputs suitable for Class I Zone 0 hazardous locations.
- Has group classification is Group IIA. This includes suitability for propane, petrol, methane, ethanol, etc.
- Has a surface temperature classification of T4 - maximum surface temperature of 135°C
- Has an ambient operating temperature range of -40°C to +55°C
- With the o-ring fitted in the base and the use of appropriate glands, provides a degree of protection of IP66.



Triacs

The triacs or solid state relays are 240V output switches controlled by the C4000. These are wired to the pump contactors and solenoids as shown below.

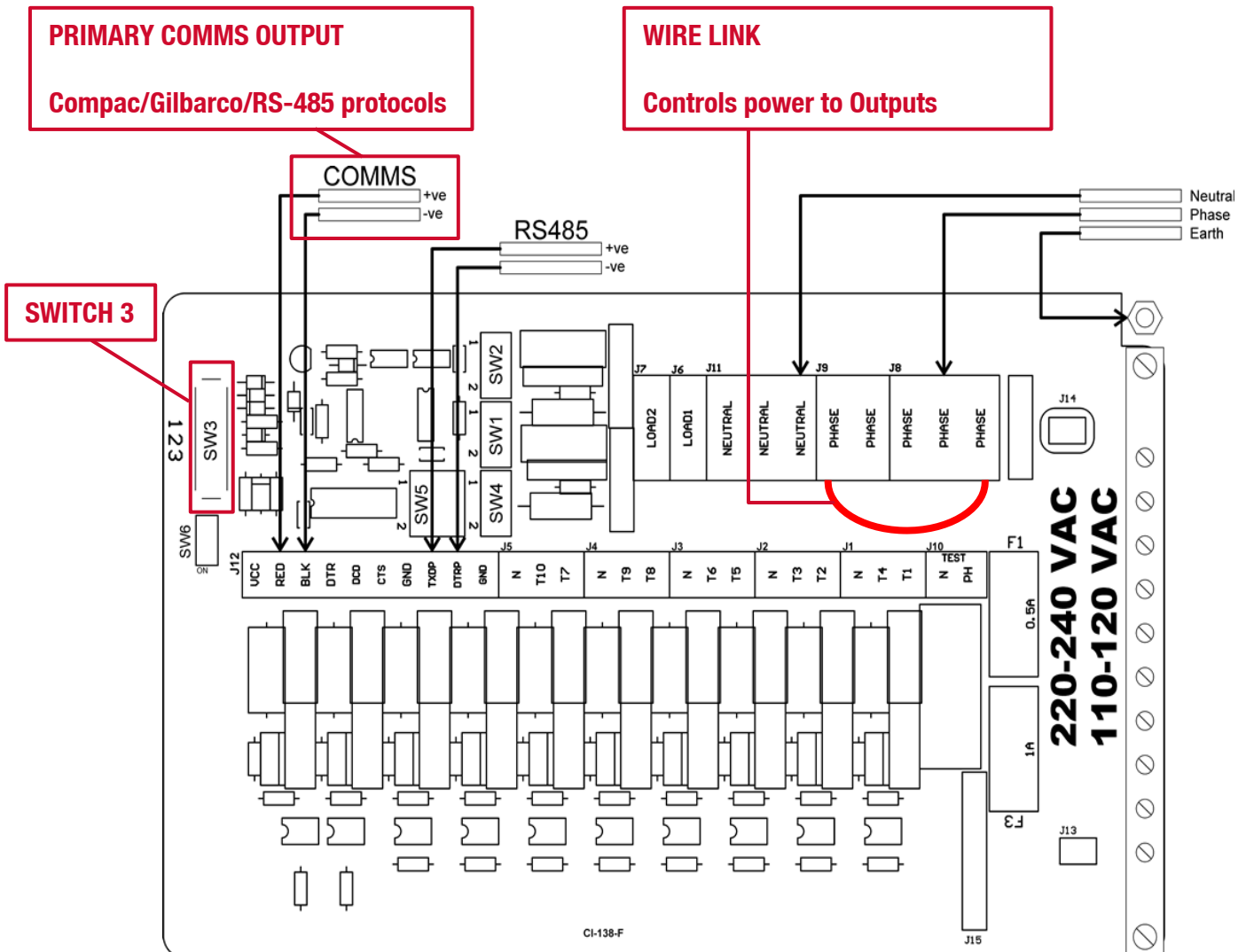
There may be occasions when the high/low flow solenoid coil may not be able to be installed in its normal orientation. If the coil is reversed on the solenoid, the connections on the C4000 must be reversed also.

Communications Protocol

The communications protocol of the primary COMMS output of the C4000 power supply is controlled by switch 3 (SW3) on the C4000 power supply. The configurations are as follows:

- Position 1** = Compac COMMS Protocol
- Position 2** = Gilbarco COMMS Protocol
- Position 3** = RS-485 Protocol

There is also a secondary RS-485 output usually used for remote displays.



| Power Terminal | Function | High/Low |
|----------------|---|------------------------|
| | LPG Single/Dual: | Current output: |
| T1 | Electric Motor Control (SW1 = 2) side 'A' | Low (300 mA max) |
| T2 | Secondary (low flow) Solenoid Control Side 'A' | Low (300 mA max) |
| T3 | Primary (high flow) Solenoid Control Side 'A' | Low (300 mA max) |
| T4 | Electric Motor Control (SW2 = mid) Side 'B', looped to T1 | Low (300 mA max) |
| T5 | Secondary (low flow) Solenoid Control Side 'B' | Low (300 mA max) |
| T6 | Primary (high flow) Solenoid Control Side 'B' | Low (300 mA max) |
| T7 | Spare | Low (300 mA max) |
| T8 | Spare | Low (300 mA max) |
| T9 | Spare | Low (300 mA max) |
| T10 | Excess flow output - Turned on if flow rate exceeds 100litres/min. Stays on until dispenser turned off. | Low (300 mA max) |

Intrinsically Safe Wiring

Nozzle Switches

The nozzle switch leads plug in between 'NSWx' and 'GND'. When the nozzle is lifted, the nozzles switch closes and the C4000 initiates a transaction.

NOTE: Diagnostic LED will flash rapidly when any nozzle is lifted regardless of hose configuration.

Display Backlighting

The backlighting units for the display PCB's are mounted behind the LCDs and should not be removed.

The backlighting is supplied from the C4000 'Backlight' plug (J17). This is an intrinsically safe supply.

Servicing

Tools

Servicing the dispenser does not require any specialised tools but to undertake comprehensive servicing, repairs and calibration the following equipment is required. Before attending the site, read the manual and establish the equipment that you will need to take to site.

- A full set of metric and imperial wrenches
- A 9/16" or 14mm Allen key or hex key
- Long nose pliers
- An LPG Master Meter or
- An accurate temperature probe or thermometer plus a hydrometer for measuring the specific gravity of LPG
- A multimeter
- An earthing strap

Initial Servicing

Contamination of the fuel supply from dirty pipework is the prime cause of meter and solenoid problems. Two weeks and three months after commissioning a new site the strainer should be cleaned.

- Clean the strainer.
- Check the system for leaks.
- Inspect the breakaway and make sure it is rotating freely and shows no sign of damage.
- Make sure the doors are correctly in place and all panels are secure.
- Check the operation.

Annual Servicing

Every twelve months:

- Clean the strainer.
- Do a calibration check. Adjust if necessary.
- Check the system for leaks.
- Clean and lubricate the breakaway and make sure it is rotating freely and shows no sign of damage or corrosion.
- Make sure the doors are correctly in place and all panels are secure.
- Check the condition of the LPG Hose. Replace if necessary.
- Check the operation.

In areas where fuel is of low quality, it is recommended to clean the strainer on a more regular basis.

Mechanical Servicing

Degassing

DANGER

Take extreme care when degassing to ensure there are no possible sources of ignition anywhere in the vicinity. Ensure you know exactly what you are doing to avoid uncontrolled release of gas.

PRECAUTIONS

Gloves, eye and hearing protection should be worn and all potential sources of ignition isolated or removed from the vicinity.

The equipment must be carefully degassed before attempting to service any of the hydraulic equipment.

On a dual unit both sides of the dispenser have a common inlet and vapour return line. Both sides require degassing to do work on either side. Close the inlet and vapour return valves before degassing. Degas the dispenser using the following procedure.

- Put the dispenser into Purge Mode using the Parameter switch.
- Close the inlet valve on the dispenser.
- Connect the hose to an empty tank and commence a fill. This will open the solenoids and degas the hose.
- When the dispenser times out for low flow, shut the outlet valve, disconnect tank and vent hose nozzle. On a two hose model do the same for the other hose.
- Isolate the dispenser
- Close the vapour return valve and vent the vapour return line by loosening a pipe joint between the manifold and vapour return flange.

Be aware when disassembling components that there may still be LPG contained in them and appropriate precautions should be taken.

CAUTION

Do not try to release pressure by loosening flanged joints as they are sealed by 'O' rings which will remain sealed until the 'O' ring blows out. This will damage the 'O' ring and may cause uncontrolled release of gas.

Strainer

To avoid sealing problems and damage to the solenoid, a strainer is fitted to the outlet side of the V50 meter manifold. It should be cleaned after initial installation and commissioning to remove any debris that may have come from the pipework. Cleaning after 2 weeks and 3 months after installation is also advised. After that, annual cleaning is recommended or more frequently if the LPG is dirty or flow problems are detected.

Cleaning the Strainer:

- Turn off and degas the dispenser
- Remove the strainer using a 9/16" (or 14mm) Allen key.
- Clean the strainer thoroughly and inspect for damage. Replace if damaged.
- Clean the strainer cavity in the manifold block taking care not to push debris into the outlet pipe.
- Replace the strainer and tighten firmly.
- Re-gas the dispenser and check for leaks.

Check/Relief Valve

To prevent LPG running back through the meter a check valve is installed in the manifold between the outlet of the meter and the solenoid. The valve also contains an internal pressure relief valve that will release pressure in the pipework back to the tank. The check valve rarely gives problems but if the meter is detecting reverse flow, it should be checked and replaced if required.

Servicing the Check Valve:

- Degas the dispenser.
- Undo the two bolts that hold the meter outlet manifold to the solenoid.
- Undo the two bolts that hold the outlet manifold to the meter and remove the manifold block by pulling it upwards.
- Unscrew the valve retaining plate from the block and remove the spring and valve. Clean and check for wear or damage and replace if needed.
- Remove and clean the strainer and all the internal ways while the manifold is apart.
- Replace valve and spring and secure with the retaining plate.
- Check the 'O' rings on the meter and manifold block for damage, cracking or hardening and replace if required.
- Refit the manifold block to the meter and solenoid.
- Re-gas the dispenser and check for leaks.

V50 Meter Servicing

The V50 meter is field serviceable, and its electronic module can be removed and replaced.

Replacing the Electronic Module

The electronic module can be replaced without degassing the dispenser.

- Turn the power off the dispenser.
- Remove the side panel to access the meter.
- Undo the retaining screws on the front of the meter.
- Snip the sealing wires and remove the electronic module from the meter.
- Snip any cable ties and noting where it is plugged in, unplug the module from the C4000 board.
- Fit the new electronic module to the meter. Feed the cable up to the C4000 board and plug it into the same socket as the old module (the clips face outwards).
- Cable-tie the new cable in place and fix the module in place with screws and new anti-tamper seals.

Pairing the Electronic Module

The new module needs to be paired to the C4000 board using the K-Factor switch.

- Start the dispenser and copy down the serial number stuck on the face of the new module.
- Using the K-Factor switch scroll through the menu until you reach the Id-A (side A) or Id-b (side B) screen depending on which meter the module belongs to (dual hose models).
- By pressing then holding in the K-Factor switch, scroll through each digit in turn until the number matches the number printed on the new module.
- When you have the correct number continue to scroll through until you leave the Id menu entirely.

NOTE: On two hose units it is important to do this operation even if you are only replacing one module. Failure to do this is one of the prime causes of setup problems.

You will now need to calibrate the new module.

Removing the V50 Meter

The entire V50 meter is available as a spare part complete with electronic module.

- Turn off the Liquid and Vapour return lines at the base of the dispenser.
- Turn the power off the dispenser.
- Degas the LPG dispenser.
- Snip any cable ties and noting where it is plugged in; unplug the meter from the C4000 board.
- Undo the six screws holding the meter in place and remove the meter.

Replacing the V50 Meter

- Make sure the O rings are in place and the front of the meter containing the electronic module is facing out.
- Using the six screws, fasten the new meter in place.
- Feed the meter cable up to the C4000 board and plug it into the same socket. The clips face outwards.
- Cable-tie the lead neatly out of the way if required.
- Make sure all connections are tight and any drain valves closed.
- Pressurise slowly while checking for leaks.
- Restart the dispenser and pair the new meter to the C4000.
- Calculate and enter the temperature and density offsets and then calibrate the meter.

Calibrating the V50 Meter Temperature.

To calibrate the temperature setting of the meter:

- Place a thermometer probe into the thermo well on the top of the inlet manifold.
- Run fuel through the meter to balance the temperature of the meter and thermo well.
- Using the K-Factor switch, scroll through until the top line of the display reads E-A. The line below shows the compensated temperature reading and the \$/Litre display shows the temperature the meter is reading in degrees C.
- Use the K-Factor switch to change the compensated temperature to match the reading of your temperature probe.

For a two hose model, perform the same operation for side B.

Calibrating the V50 Meter Density.

To calibrate the density setting of the meter:

- Use a hydrometer to take the density and temperature of the LPG.
- Use density tables to calculate the density at 15°C
- Using the K-Factor switch, scroll through until the top line of the display reads d15-A. The line below shows the compensated density reading and the \$/Litre display shows the density the meter is reading.
- Use the K-Factor switch to change the displayed compensated density to match the actual compensated density of the LPG sample.

For a two hose model, perform the same operation for side B.

Calibrating the V50 Meter K-Factor

The calibration factor is a proportional factor of calculated litres dispensed compared to actual litres dispensed. A calibration factor must be set for each meter in the dispenser. There are two methods of determining the K-Factor of the LPG meter.

Gravimetric Method:

- Make sure the meter temperature offset has been calibrated correctly.
- Using a hydrometer, take the temperature and density reading of the LPG. Use the density compensation tables to convert the density to 15°C.
- Using the K-Factor switch, check that the density offset figure matches the converted density figure. Change the offset if needed.
- Using the K-Factor switch, scroll through to the C Configuration and check that the temperature compensation is turned ON. The configuration code should be C0XXXX.
- Make a few deliveries so the temperature of the LPG in the dispenser is at tank temperature and to make sure there is no vapour in the system.
- Put an empty test bottle on the scale and zero the scale or record the bottle weight.
- Remove the nozzle from the nozzle holder and screw it into the bottle and open the valve on the tank only. Do not open the LPG nozzle.
- Press the start button.
- Wait for the displays on the dispenser to go through its 88888's and return to 0.00
- Open the nozzle valve.
- When dispenser has reached around 20 litres turn the nozzle valve off.
- Turn off the tank valve and unscrew the nozzle valve from the tank and hang up the nozzle.
- Record the weight of the tank and the litres delivered on the dispenser
- Divide the weight of the LPG delivered by the density factor at 15°C (Volume dispensed) and compare this with the displayed Litres delivered. If the calibration is out adjust the K Factor using the following formula: $\text{New K Factor} = \frac{\text{Existing K Factor} \times \text{Volume dispensed}}{\text{Volume displayed}}$.

Master Meter Method:

- Set the temperature compensation OFF. The C configuration code should be set to C2XXX.
- Connect the dispenser nozzle to the Master Meter. Connect the Master Meter into the Vapour Return line fitting.
- Make a few deliveries back into the main tank so the temperature of the LPG components in the dispenser is at tank temperature and to make sure there is no vapour in the system.
- Make a delivery of 100 litres. Make sure the dispenser goes through the 88888's before starting the fill through the master meter. The reason for this is that the dispenser primary solenoid is opened during the 88888's to purge the refuelling hose of any accumulated vapour to prevent pre-registration of the meter.
- Compare the reading of the Master Meter [Vd] with that of the dispenser [Vr].

NOTE: if the temperature at the master meter is different to the temperature at the dispenser then that must be corrected using ASTM Table 54. Very approximately: a 1°C temperature difference causes a 0.3% difference in volume.

NOTE: the design of the V50 LPG dispenser means there should be negligible pressure drop between the dispenser and the Master Meter. If regulations or site specific requirements require a compressibility factor to be included in calculations, compressibility factor tables are included in the V50 service manual.

- Increase or decrease the calibration K-Factor to make the dispenser's displayed litres amount increase or decrease by the proportion of difference.
- New K Factor = Existing K Factor x Vd/Vr

Once the new K-Factor has been found, change the K-Factor setting of the dispenser as below:

- Hang up the LPG nozzle after doing a test fill.
- Press the K factor switch once and release. The display will show FXXXXX if the dispenser is a single and FAXXXXXX if the dispenser is a dual. XXXXX is the default factory K-Factor setting for LPG.
- Press the K-Factor switch until you reach the digit you want to change and hold the K-Factor switch in to scroll. When the correct digit is reached release the switch.
- Press and hold the switch again and the next digit will scroll. When the correct number is reached release the switch.
- Continue this procedure until the correct K-Factor is entered.

Do another fill to check the calibration.

Solenoid Servicing

The Compac LPG Solenoid is a $\frac{3}{4}$ " piston valve with two coils to allow high flow and low flow options. The solenoid valve operates only in one direction and prevents back flow.

Solenoids do not like dirt. The Compac LPG dispenser has a strainer in the manifold block to prevent dirt from damaging the solenoid parts. In normal life the solenoid should not need servicing. If you think there is a problem with the solenoid follow the troubleshooting guide. If service is necessary, please make sure you have a service kit before disassembling the valve as seals may expand when exposed to air and be unusable.

Degas the dispenser before servicing. Do not attempt servicing without a service kit on hand as O rings will need to be replaced even if no other work is done.

NOTE: the orientation of the coils is critical to the correct operation.

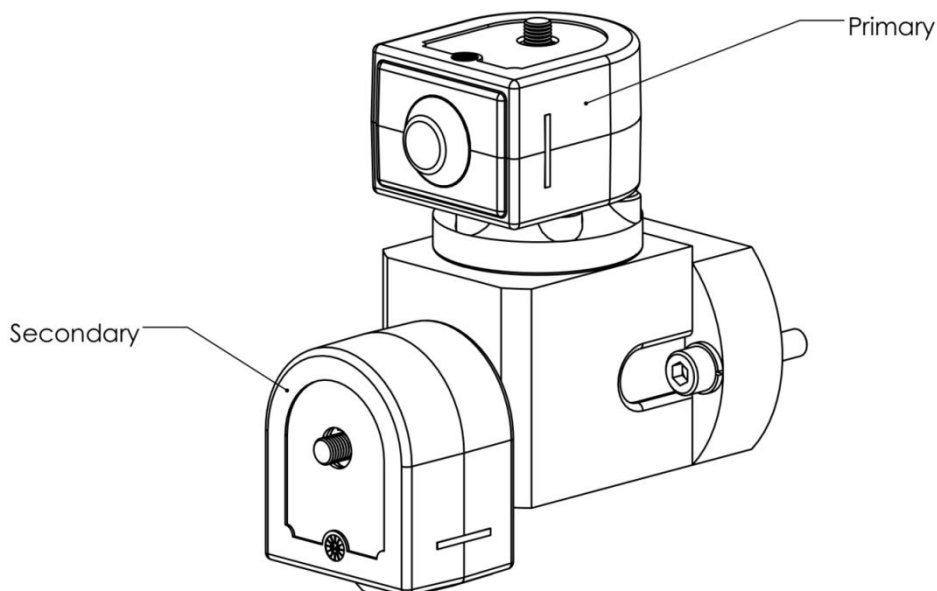
CAUTION

Do not remove the coils from the solenoid while there is power on the dispenser.

Disassembling the Solenoid

- Unscrew the nuts on the top of the coil assemblies. The washers and the coil assemblies can now be removed.
- Use a socket or spanner to undo stem/sleeve assembly
- The plunger and the return spring can now be removed. Take care not to lose the plunger or springs.
- Unscrew the six cover screws.
- Remove the cover.

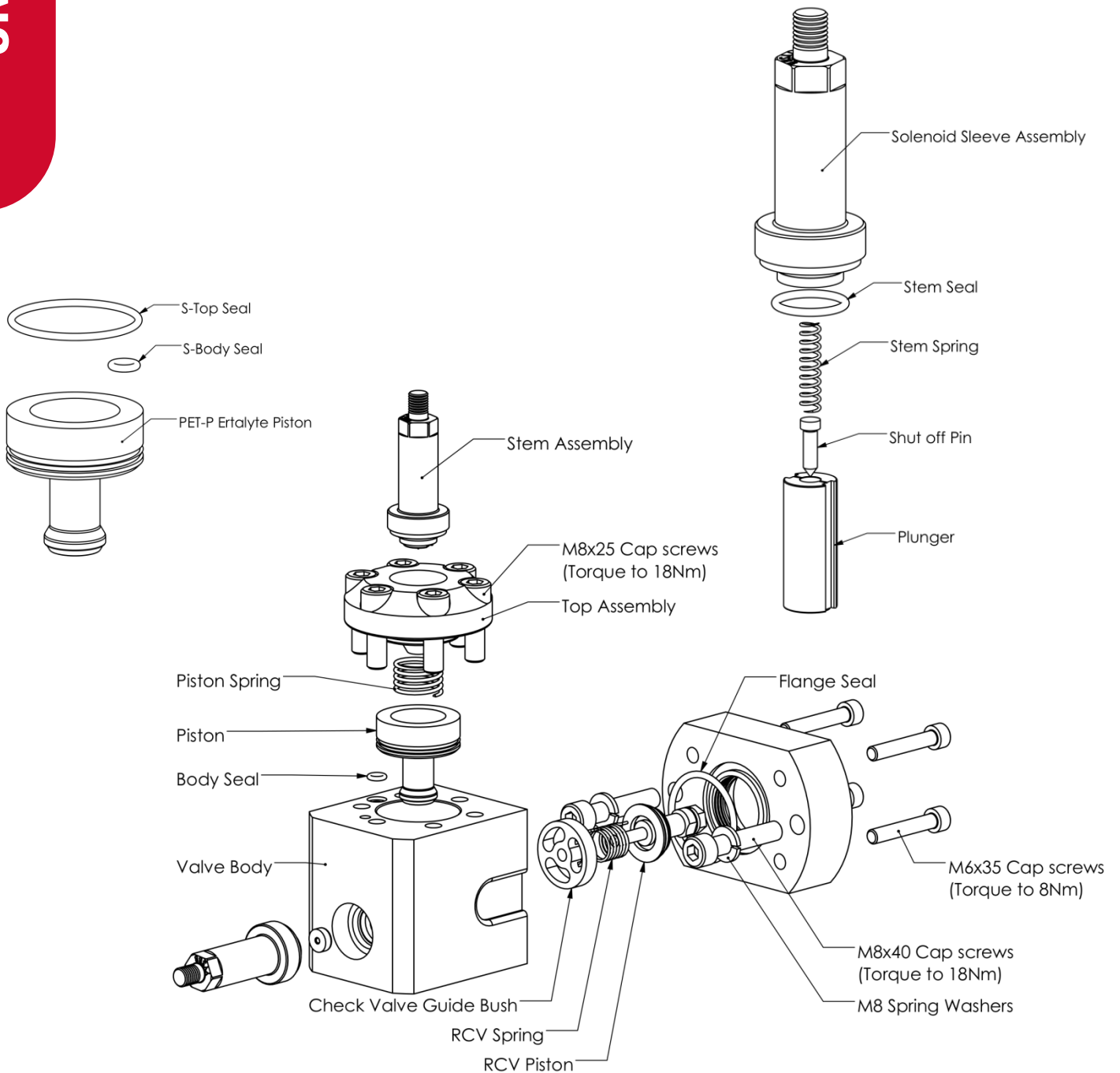
If the cover cannot be easily lifted off the body, gently tap the sides of the cover or gently pry the cover from the body with a screwdriver. Care must be taken not to damage the piston, cover or body. Piston return springs, piston assembly, and O-rings can now be removed.



Reassembling the Solenoid

- Make sure all the parts are clean and free from any grit or debris.
- Replace all parts supplied with the kit. Do not attempt to re-use O-rings.
- Fit and tighten the 6 cover screws to a torque of 18Nm.
- Install the plungers and springs into the sleeve.
- Tighten the sleeve assembly with a torque.

Replace the coil assembly making sure it is around the same way as fitted originally.
Replace washers and tighten the nuts.



Breakaway Servicing

Regularly check that there are no foreign bodies in the moving parts, clean and lubricate.

Replace the O-rings every 1000 hrs or every time the breakaway is re-assembled

Reassembling the Breakaway

CAUTION

Take extreme care when reassembling breakaway as hoses may remain under high pressure after drive-away.

NOTE: *the hoses may have to be depressurised before the breakaway can be reassembled. Damaged Breakaways must be replaced as they could separate under pressure causing serious injury.*

The breakaway should only be reassembled by a qualified LPG service-person.

Examine the breakaway and tether for damage, particularly the coupling and surfaces where it fits inside the body. If there is any visible damage, the breakaway must be replaced.

Recouple the Breakaway.

Pull on the coupling to make sure it has engaged

Trouble Shooting

Electrical

No Power

- Check power to dispenser/pump unit.
- Check Power LED.
- Check connections.
- If Power LED is off, check for a short on intrinsic devices by unplugging each device until the Power LED lights up.
- Check fuse F1.
- Replace C4000 if fault not found.

Pump Cuts Out

- Check end of sale indicator in the pump number setting on the parameter switch to determine what ended the fill.
- Check Watchdog LED to see if there is a software issue.
- If Watchdog LED is on, check that memory chips are firmly in their sockets.
- Replace C4000 if watchdog is on after repowering unit.

Pump Not Starting

- Check Triac fuse F2
- Check all pump motor connections.
- Check pump motor.
- Check wiring.
- Select a spare High Current Solid State Relay if the above checks are okay.
- If Output LED is off, check nozzle switch, the nozzle switch is working if the Diagnostic LED flashes faster when switch is on.
- Check Display connection.
- Replace C4000 if fault not found.

Pump Not Stopping

- Check nozzle switches are releasing, the nozzle switches are working if the Diagnostic LED flashes faster when switch is on.
- If Output LED is off, select a spare High Current Solid State Relay.
- Replace C4000 PCB if fault not found.

Solenoid Not Energising

- Check Triac Fuse F2
- Check all Solenoid connections
- Check Solenoid
- If Output LED is off, check nozzle switch operation, the nozzle switches are working if the Diagnostic LED flashes faster when switch is on.
- Select a spare Low Current Solid State Relay if the above checks are okay.
- Replace C4000 if fault not found.

Solenoid Not De-energising

- If Output LED is on, check nozzle switch is releasing, the nozzle switch is working if the Diagnostic LED flashes faster when switch is on.
- Select spare Low Current Solid State Relay.
- Replace C4000 if fault not found.

Mechanical

No Flow

- Excess flow of 100lpm reached and LPG pump has shut off.
- Excess Flow Valve in the dispenser has been tripped.

This can happen if the dispenser sits idle for a period of time on a hot day. The LPG in the hose vaporises. When a vehicle commences its fill the surge of LPG into the hose can trip the excess flow valve. This occurrence is very rare.

The excess flow valve will trip however if an empty vehicle is connected and the nozzle switch is manually released after the vehicle is connected. The rush of LPG into the hose will trip the excess flow valve.

- Insufficient pump pressure. A minimum pump pressure of 700kPa above the tank vapour pressure is recommended. Sometimes on a hot day a vehicle with a hot LPG tank may try and fill from a site with an underground tank. The vehicle tank pressure may be significantly greater than the underground LPG tank pressure and the LPG pump cannot overcome the pressure difference. The vehicle cannot be filled. This is not a dispenser problem. A more powerful pump is required.
- Solenoid Coil burnt out.

On some installations an ISC valve is fitted below the dispenser to cut off the flow if a vehicle hits the LPG dispenser. There have been installations where the ISC valve has been installed too close to an elbow or T and has not been able to open fully. The restriction has been enough to cause back pressure in the vapour return line and prevent the differential valve from opening and thereby the dispenser cannot deliver LPG.

- Inlet/Outlet valves closed.
- Breakaway partly reassembled. Check the breakaway is fully screwed together.

Low Flow

Typically the flow rate through the dispenser should be 20 - 30 lpm with a differential pump pressure of 700 kPa above the tank vapour pressure.

- 'K' Factor set incorrectly showing false flow rate.
- Solenoid Valve not opening fully.
- Solenoid coil wired incorrectly or high-flow coil not working.
- Strainer excessively dirty.
- Excess Flow Valve closed. (This often happens after the hose has been degassed.)
- Shut off valves not fully opened.
- Breakaway not correctly reassembled. (The collar must be tightened firmly by hand.)
- Insufficient pump pressure. (A minimum differential pressure of 700kPa between the liquid and vapour lines is recommended.)
- Nozzle faulty. Replace and repair the nozzle.

Pre-Set Overrun

- Solenoid blocked and cannot close or has a damaged piston.
- Solenoid coil wired incorrectly. Check solenoid orientation.
- P-cut setting too low. Adjust P-Cut setting.

Calibration Problems

- Check that configuration is correct for calibration method - i.e., temperature compensation on or off.
- Check that minimum flowrate is above 15 lpm.
- Check that filter is not dirty.
- Check that temperature measured by temperature probe is correct.
- Check that the density of the LPG is set correctly.

Solenoid Valve Not Opening

- Check the Solid State Relay LED on the processor board.
- Check the electrical supply to the coil. Check the C4000 output triac is switched on. There should be 220 – 240 volts across the solenoid coil.
- Put power on the solenoid and hold a screwdriver above the coil to feel the magnetic field pull. Because of the construction of the coil a resistance reading cannot be obtained.

Make sure the pressure on the inlet to the solenoid does not exceed 2,400kPa [350psi].

Solenoid Valve Sluggish or Inoperative

If the voltage and pressure check out.

- Disassemble and clean out all extraneous matter ensuring all passages are clear.
- The plunger must be free to move without binding. The plunger spring must not be broken.
- Check the diaphragm bleed-hole and pilot orifice for clogging or tearing. Examine the return springs.
- Replace parts as necessary.

Solenoid Leakage at Sleeve

- Check the sleeve is tight.
- If leak persists, remove sleeve and check cover and sleeve for nicks at the point of contact between the sleeve and cover.
- Replace parts as required.

Solenoid Leakage at Body

- Retighten cover screws with a torque of 18Nm.
- If leakage persists. Check O-rings are sealing. Check body or cover for damaged sealing surfaces.
- Repair or replace if required.

Error Messages

| Error Code | Fault | Solution |
|---------------|---|---|
| Err 3 | No price set. | Set a price at the pump or at the controller. |
| Err 7 | Excess flow. | Flowrate has exceeded 100lpm. |
| Err 8 | Reverse flow. | Check product is not flowing back into the tank once the delivery has finished. This only occurs if the non-return valves installed on site are faulty. |
| Err 9 | Faulty or disconnected electronics on V50 meter. | Check meter wiring. Replace meter board. |
| Err 10 | Configuration lost. | Reconfigure C4000. Note: If this fault re-occurs the Memory IC should be replaced (DS1225Y). |
| Err 12 | C4000 memory failure. | Change memory IC (DS1225Y). |
| :0.0 | The processor supply has been OFF and back ON since the last transaction. | Check mains supply to dispenser. If there is not a supply problem check and replace C4000 Power supply and/or Processor board. |

| Error Code | Fault | Solution |
|----------------|--|---|
| CALi b | Calibration required. | Check meter K-Factor. The C4000 will recognise that the K-Factor has been viewed and will use the existing K-Factor. If necessary, recalibrate the meter. |
| Err 50 | Modbus meter communication issue. | Check that the meter(s) is plugged in correctly. Check the meter id on the K-Factor switch. |
| Err 52 | Meter issue. | If the error persists, repower the unit. Otherwise a replacement meter may be required. |
| Err 53 | Slug flow. | Check that the inlet valve is open. Check filters and valves for obstructions. |
| Err 54 | Temperature out of range. | Calibrate meter temperature using the K-Factor switch |
| Err 55 | Dispenser not ready. | If the error persists, repower the unit |
| Err dEn | Density out of range. | Calibrate the meter density using the K-Factor switch. |
| GAS | Vapour detected, displayed until next sale is started. | Make sure LPG pump is running. If this error occurs regularly, increase the Line delay on the K-Factor switch |

End of Sale Indications

The C4000 can display the reasons the last sale ended. This information is displayed as a number, which appears in the unit price display, when setting the pump number. The following table gives the reasons corresponding to each number.

| Numerical Indicator | Readout | Explanation |
|---------------------|-----------|--|
| 1 | "NOZ" | Nozzle hung up. |
| 2 | "PRESET" | Stopped at the preset. For CNG dispensers - completed a temperature compensated fill |
| 3 | "TIMEOUT" | No flow. |
| 4 | "REMSTOP" | Pump controller initiated stop. |
| 5 | "MAX" | Maximum litres and/or dollars reached. |

| Numerical Indicator | Readout | Explanation |
|---------------------|----------------|---|
| 6 | "AIR" "GAS" | Air cut-out (Diesel air cut-out switch). Creepage due to vapour (LPG Dispenser). |
| 7 | "ERROR" | Encoder error, excess flow, etc. |
| 8 | "SEQUENCE" | CNG applications only. |
| 9 | "SUMP" | Switch activated by leaking product. |
| 10 | "BULK SAFETY" | |
| 11 | "NEW CWID" | |
| 12 | "DPE MAIN" | Parity error on main display |
| 13 | "DPE MP" | Parity error on multi price display |
| 14 | "DA MAIN" | Parity error on main display |
| 15 | "DA MP1" | Parity error on multi price display 1 |
| 16 | "DA MP2" | Parity error on multi price display 2 |
| 17 | "DA MP3" | Parity error on multi price display 3 |
| 18 | "DA MP4" | Parity error on multi price display 4 |
| 19 | "LPG CREEP" | |
| 20 | "TC1" | CNG Temperature compensated fill stage 1 |
| 21 | "TC2" | CNG Temperature compensated fill stage 2 |
| 22 | "TC3" | CNG Temperature compensated fill stage 3 |

Spare Parts

Mechanical

| Description | Part Number | Part Book Description |
|-------------------------------|-------------------|--|
| V50 LPG meter complete | F-D-MTR-V50AB | V50 Coriolis meter |
| OPW OAS400 Breakaway | F-DL-BW-OAS400 | OPW OAS400 breakaway complete |
| OPW OAS400 Breakaway seal kit | F-DL-BW-OAS400SK | OPW OAS400 breakaway seal kit |
| GasGuard LG1E Nozzle | F-DL-NOZL-LG.1A | Nozzle complete |
| LG1E Swivel | F-DL-NOZL-LG1-SW | Swivel |
| External Highmast complete | F-DL-HIMAST-WPO | Highmast with Bracket & Bolts for Mounting |
| Solenoid Valve Service Kit | F-ABSVK-0101 | S2 ADBLUE/LPG Solenoid Valve Service Kit. Incl. Piston Assy, "Solenoid Top" O-rings. (For AdBlue/LPG Solenoid vlvs only) |
| RCV piston replacement | F-DL-RCV-PISTASSM | LPG RELIEF CHECK-VALVE PISTON ASSEMBLY |

Electrical

| Description | Part Number | Part Book Description |
|--|--------------------|--|
| C4000 Micro Processor Board for a V50 Meter | F-CP-C4PROCESIA2 | Normal Speed Mark 2 C4000 Processor Board 4.75V Watch Dog. No Memory or Software |
| C4000 Power Supply Board Assembly | F-CP-C4PWRASS230 | C4000 Power Supply Assembly (A0), (CI 138-C) |
| C4000 standard software. Australia and New Zealand | F-CS-IC-C4DISP | SOFTWARE EPROM FOR DISPENSERS (C4000) |
| Electromechanical tote and cable | F-BW-AMCBL02T1000K | Tote Kit with 1000mm Cable comes with Brackets & Instruction |
| Solenoid coil | FC-COIL-0005 | 28VA Coil for "S2" 350 Bar Solenoid Valve. |
| 7 Digit Display | F-CP-DSPLY-7D1PRC | 7D1 Display with Vinyl Fascia Decal for Remote Displays. (Excludes Rear Cover) |
| 7 Digit Display rear cover | F-CP-DSPLY-7DCVR | 7D1 DISPLAY REAR COVER (INCLUDES SCREWS) |
| Preset keypad replacement | F-CP-PSET-12MEM | 12 Key Membrane Preset |

SPARES