LPG DISPENSER SERVICE MANUAL

C5000 LPG Dispenser Service Manual
Version 1.0.0

Date: 5th February 2024

compac
PREMIUM DISPENSER TECHNOLOGY

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 C5000 processor is electrical shock. This hazard can be avoided if you adhere to the procedures in this manual and exercise all due care.
- Compac Industries Limited accepts no liability for direct, indirect, incidental, special, or consequential damages resulting from failure to follow any warnings, instructions, and procedures in this manual, or any other common sense procedures generally applicable to equipment of this type. The foregoing limitation extends to damages to person or property caused by the Compac C5000 processor, or damages resulting from the inability to use the Compac C5000 processor, including loss of profits, loss of products, loss of power supply, the cost of arranging an alternative power supply, and loss of time, whether incurred by the user or their employees, the installer, the commissioner, a service technician, or any third party.
- Compac Industries Limited reserves the right to change the specifications of its products or the information in this manual without necessarily notifying its users.
- Variations in installation and operating conditions may affect the Compac C5000 processor's performance. Compac Industries Limited has no control over each installation's unique operating environment. Hence, Compac Industries Limited makes no representations or warranties concerning the performance of the Compac C5000 processor under the actual operating conditions prevailing at the installation. A technical expert of your choosing should validate all operating parameters for each application.
- Compac Industries Limited has made every effort to explain all servicing procedures, warnings, and safety precautions as clearly and completely as possible. However, due to the range of operating environments, it is not possible to anticipate every issue that may arise. This manual is intended to provide general guidance. For specific guidance and technical support, contact your authorised Compac supplier, using the contact details in the Product Identification section.
- Only parts supplied by or approved by Compac may be used and no unauthorised modifications to the hardware of software may be made. The use of non-approved parts or modifications will void all warranties and approvals. The use of non-approved parts or modifications may also constitute a safety hazard.
- Information in this manual shall not be deemed a warranty, representation, or guarantee. For warranty provisions applicable to the Compac C5000 processor, please refer to the warranty provided by the supplier.
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- Every effort has been made to ensure the accuracy of this document. However, it may contain technical inaccuracies or typographical errors. Compac Industries Limited assumes no responsibility for and disclaims all liability of such inaccuracies, errors, or omissions in this publication.

Product Identification

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.

Models Covered	Standard
Laser	LASER L-LPG
	L-LPGD
	LL-LPG

Manufactured By:

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Document Control

Document Control

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1.0.0	05/02/2024	Phillip Foy	C5000 LPG Manual

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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 C5000 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 C5000 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 C5000 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.

Introduction to the Compac LPG C5000 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 C5000 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 – 610 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 website at www.compac.biz. 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.

Installation

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

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.

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 C5000 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 C5000 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 C5000 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.

Commissioning

Electrical

This procedure outlines how to perform an electrical operational test before carrying out full mechanical commissioning, making sure that the dispenser is functioning correctly. Check for any damage that may have occurred in transit. Check all terminals, plugs, and chips to make sure that they are securely in place.

NOTE: *Damage to electronics occurs most commonly from vibration and jarring.*

Before beginning this test, check that no gas pressure has been applied to the dispenser inlets. The factory set-up information should be programmed into the dispenser, but all K-factor and Parameter switch settings should be checked and confirmed before commissioning tests are carried out.

To perform an electrical operational test:

1. Make sure that the inlet shut-off valves are closed (these are the valves in the inlet lines at the base of the dispenser, but they are not part of the dispenser).

2. Turn on the power supply to the dispenser.
   The displays and backlighting will illuminate, and the displays read hoLd.
   The dispenser is in a **ready state** once the hoLd is finished, and the display shows 0.00.

3. With the dispenser in a **ready state.**
   Press the **Start** button.
   The display will show 888888 and the solenoids energise, initiating a fill.
   On the K factor board check that the output leds T1 T2 and T3 turn on, indicating a signal is being sent to the triacs to open the solenoid valves.
   The diagnostic LED (D9) flashes quickly when the start button is pushed or the nozzle removed from the holster to initiate a fill. When the button is released or nozzle returned to the holster it will return to the normal state and flash slowly.

4. Verify solenoid operation by listening for a click, or by using a screwdriver tip or some other metallic tool to check for a magnetic field present on the solenoid coils.
   The solenoids will switch off after 10 seconds. This is a default time-out setting in the software for situations when there is no gas flow registered.

5. Press the stop button. The solenoids switch off and the fill ends.
   When you release the stop button, the dispenser resets and returns to a **ready state**.

Mechanical

At the mechanical commissioning stage, the dispenser should not be pressurised.

NOTE: *If you find any leaks during commissioning, immediately close all the valves and de-gas the dispenser*.

To perform a mechanical test:

- Make sure that the inlet shut-off valves are closed. (These are the valves in the inlet lines at the base of the dispenser, but they are not part of the dispenser.)
- Check all dispenser fittings, especially the inlet connections, to make sure that they are tight.

DANGER: Always de-gas the lines before tightening any fittings. Never tighten fittings while they are under pressure.

- Check that the outlet supply valve to hose 1 on the side of the dispenser (or hose 2 if you are working on side 2) is closed and the nozzle valve is closed.
- Turn on the dispenser and wait for it to power up.

The dispenser initially displays hoLd. When it is ready, 0.00 is displayed.

- Press the star button.

NOTE: *If you are commissioning a dual hose dispenser, press the Start button on either side. This opens the dispenser's solenoids. The dispenser automatically shuts off after approximately 10 seconds if no flow is detected*.

- Slowly open the inlet shut-off valves and listen for leaks. If you hear leakage, shut off the inlets immediately. If the dispenser shuts off during this process, shut off the inlet valves, restart the dispenser, and continue.
- Once the inlet valves are fully open, allow the dispenser to time out on the 10 second no-flow timer and shut the solenoid valves, or manually shut it down and close the solenoid valves by pressing the stop button.
- Press the start button on the dispenser.

NOTE*: If you are commissioning a dual hose dispenser, only press the Start button for one of the hoses*.

- Slowly open the outlet isolation valve on the side of the dispenser and listen for leaks. If you hear leakage, shut the valve immediately.

If the dispenser shuts off during this process then shut the outlet supply valve, restart the dispenser, and continue.

- Repeat steps 8 and 9 for the second hose on a dual hose dispenser.
- Once the outlet isolation valves are fully open, allow the dispenser to time out on the 10 second no-flow timer and shut the solenoid valves, or manually shut it down and close the solenoid valves by pressing the stop button.

The dispenser and hose(s) are now fully pressurised.

- Use soapy water to check all fittings (including the hose fittings) for leaks.

DANGER: Always de-gas the lines before tightening any fittings. Never tighten fittings while they are under pressure.

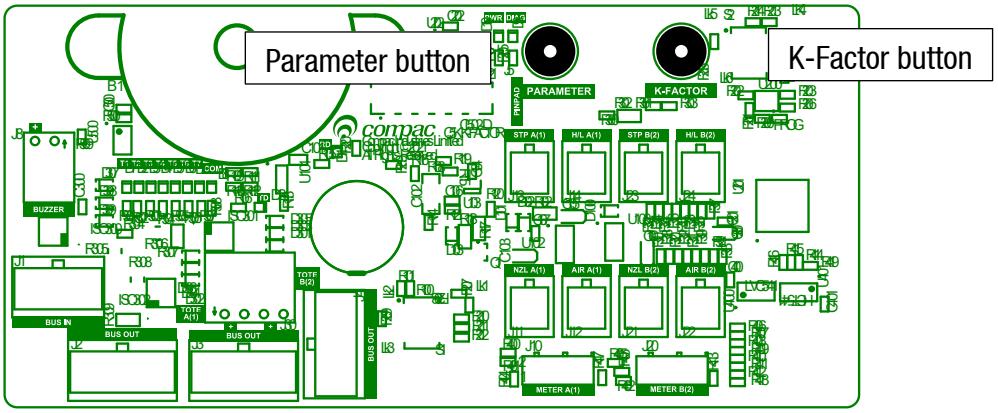
- Complete a few fills on a test cylinder, checking for leaks or unusual operation.

Dispenser Set-Up

Parameter Switch

The **Parameter** switch is located on the K factor board behind the main display and allows you to adjust the unit price, hose number, Pump settings high low cut off and display setting.

The Parameter switch also enables you to view the **Dispenser Software Version** and **End of Sale Indicators**.



Menu Options

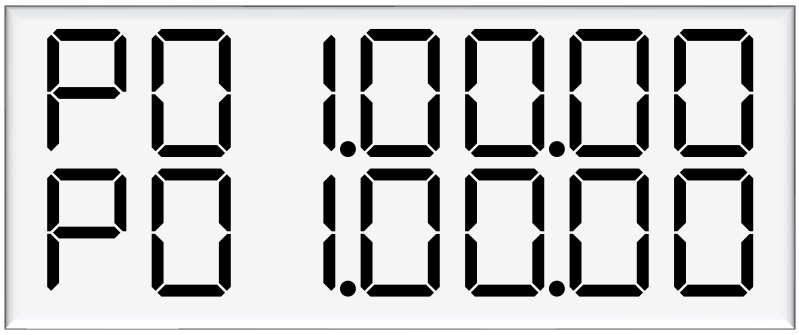
Listed below is the order in which the **Parameter** switch menu options are presented. There are different menu options depending on the current setting of the C configuration code.

The * indicates that you can achieve the displayed menu option, regardless of what the indicated part is set to. You may need to change the C configuration in order to access the parameter code you require.

Setting	Price Display	Litres Display
Software Version	P******	P******
Pump Number		PnA *** or Pnb ***
Decimal place		dP A ** or dP b
Price		PA***** or Pb*****
Pump Settings		bA **** or bb ****
Low-flow cut off		LFA *** or LFb ****
High-flow cut off		HFA *** or hFA
Heat of compression		hcA**or hcb
b Setting		b ****
Slave display		dS ****
Custom display		dc ****
		dP
		du
Last Sale	****	A **** or b ****
Electronic Totes	LA **** or dA **** Lb **** or dA ****	L****** d******

How to View the Software Version

Pressing the parameter switch once will show the software version.



The dispenser will then run through a segment test.

Changing the Pump Number

If the parameter switch is continually depressed, the following menu to change the pump number will appear. Each side must be numbered between 1-99.

NOTE: *Entering a pump number 0 will disable the pump.to the pump controller*

See Using the Dispenser Menus to edit these settings. Use the procedure for both side A and B.

Unit Price

The **unit price (PA)** is used to calculate the total value of the quantity dispensed. The unit price can be different on each side of a dual hose dispenser.

The unit price can be set at the dispenser or set remotely via a POS or controller

NOTE: *If the unit price is not set Error 3 will be displayed and the dispenser will not operate.*

To set the unit price:

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **Parameter** switch until the required unit price is displayed (**PA**).

- Enter in the unit price.

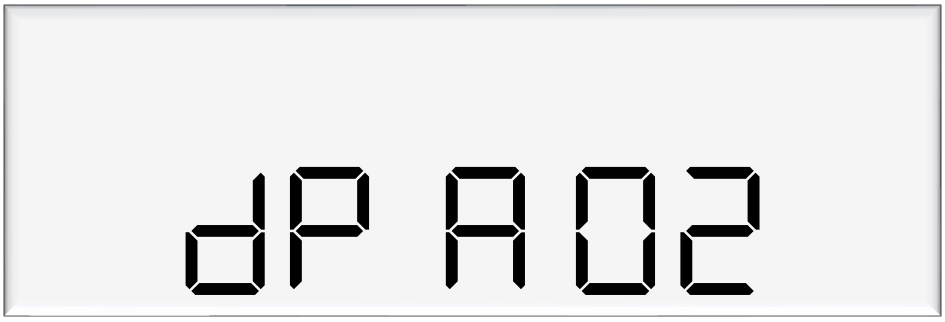
NOTE: *Each press of the* ***Parameter*** *switch passes you over a digit in a setting, making the digit blink. Holding the switch down for more than a second changes whichever digit is currently displayed. If you want to pass over a setting without changing any digits, keep pressing and releasing the switch.*

- Let the menu time out so that the value and quantity amounts are displayed.

Decimal place

The **Decimal place (dP)** is used move the decimal place for the price per unit. In some countries the price per leader can be up to 4 digits and And the price per unit is only 5 digits long.

The decimal place setting can only be set in the K factor board through the parameter button



For example

dP A02 – the Price per unit will be XXX.XX

dP A03 – the Price per unit will be XX.XXX

Note you can set each side to a different decimal place

B Pump Settings

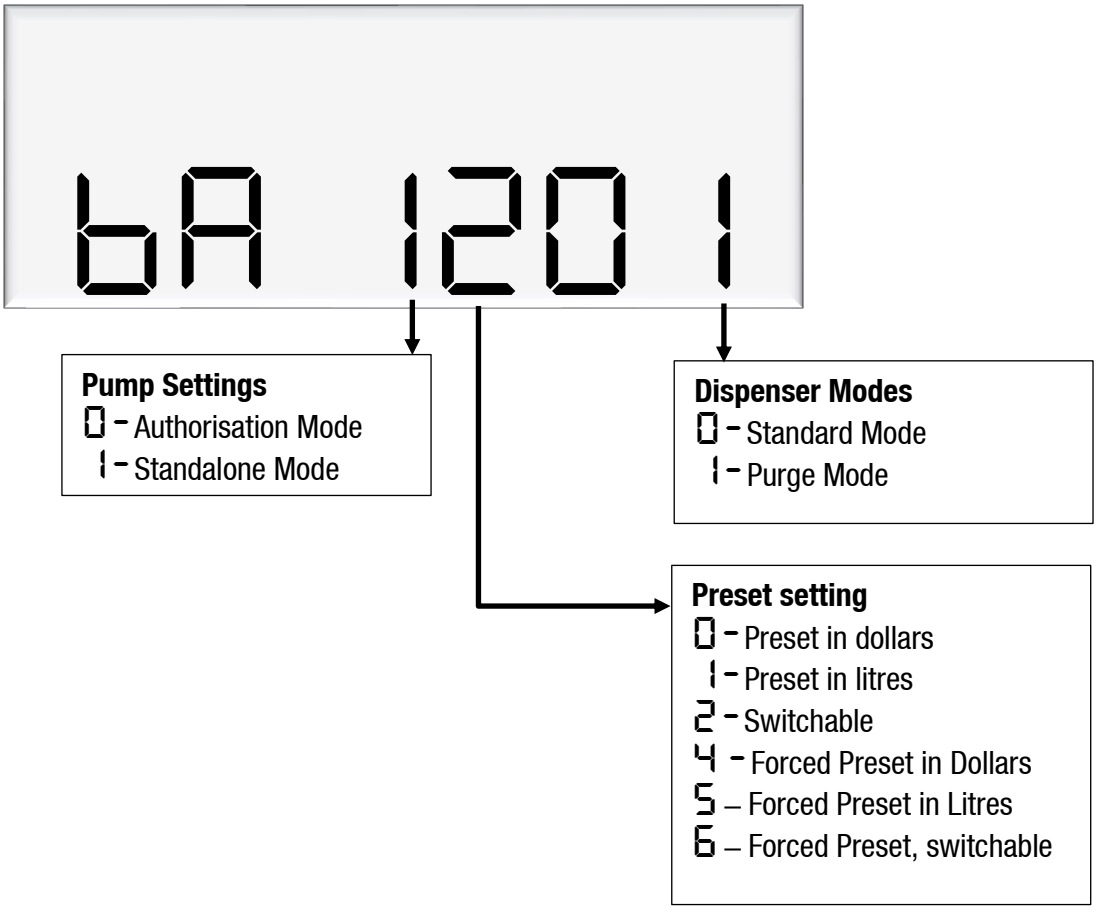
The bA setting is where you can set the dispenser in to standalone mode. Standalone mode means that the dispenser doesn't communicate to a controller or POS.

If the dispenser is in authorisation mode the dispenser will not start even if there is no controller or POS connected.

Preset setting sets the function of the Preset keypad. The settings are as follows

- 0 – The Preset is in dollars
- 1 – the Preset is in units
- 2 – The preset is switchable. You can change the preset between dollars and unit by holding the cancel button for 3 seconds
- 4 - Forced Preset in Dollars
- 5 - Forced Preset in units
- 6 - Forced Preset.You can change the preset between dollars and unit by holding the cancel button for 3 seconds

Purge mode is for when you need to purge the air out of the meter. The dispenser will disregard need errors on the meter except error 50



Changing the Low-flow Cutoff

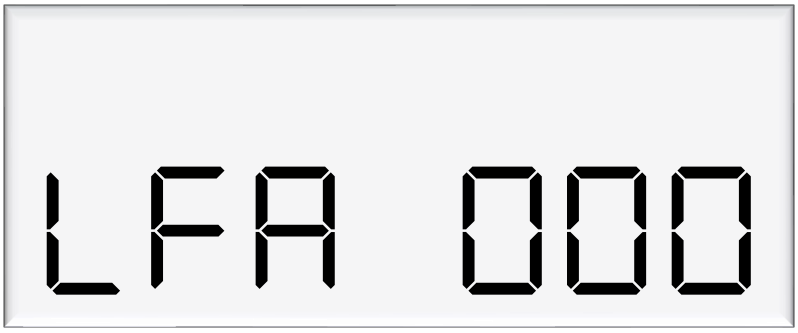
A flow range is needed for each pump to dispense an accurate amount of product. If too much or too little fuel is dispensed, the meter can not accurately measure the dispensed fuel and therefore should cut off and display an end of sale message.

The low-flow cutoff will end the transaction (without an error code) if flow drops below this value. In LPG operation, the default value for the low flow cutoff is 0.1x the maximum flow. For example, if the maximum flow was 40L/min (the default):

$$LF = 0.1\ x\ 40 = 4L/min$$

If a custom value is desired, enter the value in this menu in litres.

See Using the Dispenser Menus to edit these settings. Use the procedure for both side A and B.



To Adjust the Minimum Flow Rate

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **Parameter** switch until the required minimum flow rate is displayed. **(**LFA or LFb**)**
- Enter the new minimum flow rate.

Changing the High-flow Cutoff

The high-flow cutoff will stop transactions if the flowrate exceeds this value, and will return an error. For LPG operation the default value for the high flow cutoff is 1.5x the maximum flow. For example, if the maximum flow was 40L/min (the default):

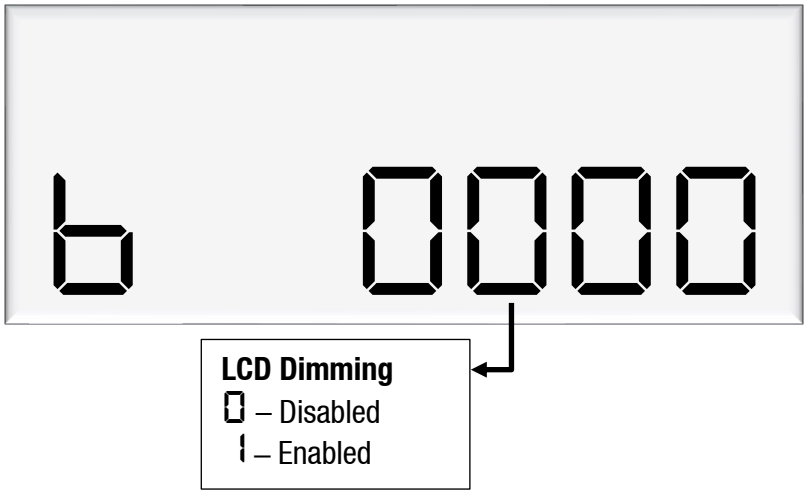
$$HF = 1.5\ x\ 40 = 60L/min$$

If a custom value is desired, enter the value in this menu in litres. In non-LPG mode, the high-flow cutoff only applies if a custom value is entered.

See Using the Dispenser Menus to edit these settings. Use the procedure for both side A and B.

Changing the b Setting

The b setting is currently only used for LCD dimming. Set the b configuration code as desired.



Slave Display Configuration

Slave displays are the displays that are additional to the K-factor board display. You can have up to 4 slave displays connected to one C5000. These displays can be configured as one of the following:

- Clone of the main display. This will display what is on the A side display but not error check the LCD
- Side A will display what is on the A side display but will error check the LCD
- Side B. will display what is on the B side display but will error check the LCD
- disabled.

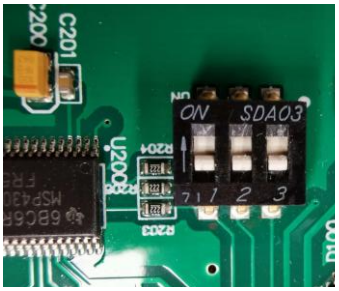
Slave display configuration is a two-step process.

1. Assign the correct number to the slave display by changing the slave display board dip switches.
2. Change dS setting to assign a side to the slave display

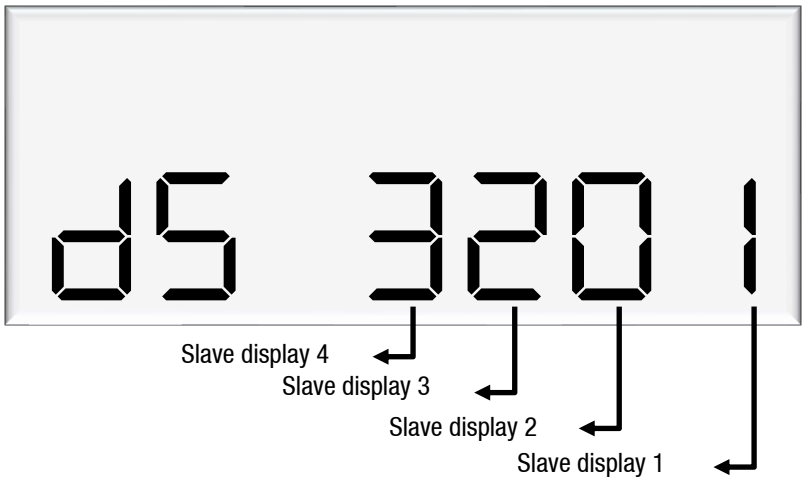
Assigning a number to slave display

Slave display numbers can be set with dip switch 2 and 3 on the slave display board. Use the following table as a guide to configure the slave displays

Slave Display	Switch 1	Switch 2	Switch 3
1	OFF	OFF	OFF
2	OFF	OFF	ON
3	OFF	ON	OFF
4	OFF	ON	ON

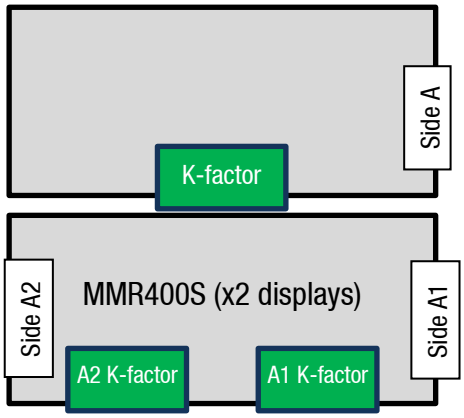


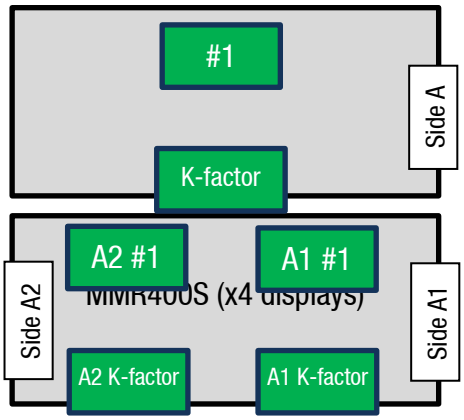
The first digit from the right correlates to slave display 1, and so on. In this example, slave display 1 – clone, slave display 2 – disabled, slave display 3 - side A, slave display 4 - side B.



Note: *Each digit can have 4 different values, each value has a different meaning.*

0 – Disabled
1 – Clone
2 – Side A
3 – Side B

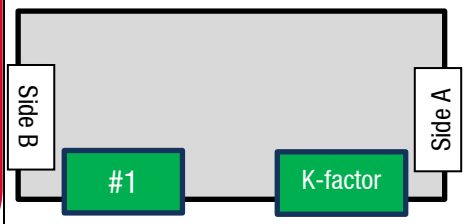
Top view of Master	Description
	One display on front fascia Set K-factor board to display Side A output (hose A1) **dS setting: 0000** Note: MMR400S with two displays is a duplicate of the above description.



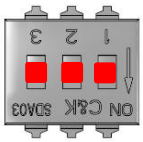
One display on front and rear fascia
Set K-factor and Slave board #1 to display side A hose.

dS setting: 0002

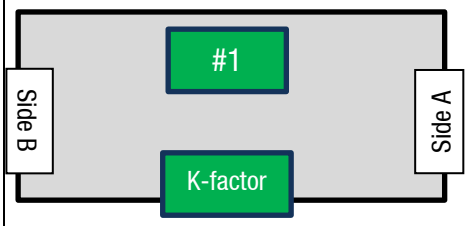
Note: MMR400S with four displays is a duplicate of the above description.



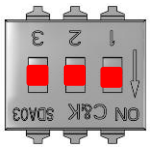
Two displays on front fascia
Set K-factor board to follow Side A (hose A1)
Set Slave board #1 to follow Side B (hose B1)



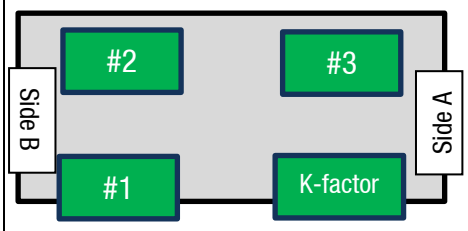
dS setting: 0003



One display on front and rear fascia
Set K-factor board to display Side A output (hose A1)
Set Slave board #1 to display Side B output (hose B1)

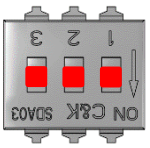


dS setting: 0003

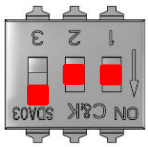


Two displays on front and rear fascia
Set K-factor and Slave board #3 to follow Side A (hose A1)
Set Slave board #1 and #2 to follow Side B (hose B1)

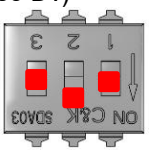
#1:



#2:



#3:



dS setting: 0233

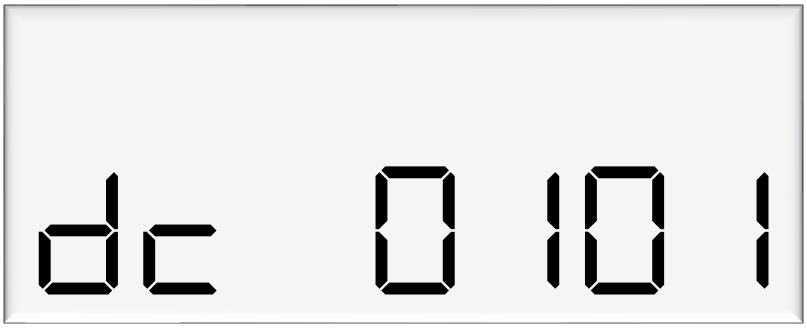
If #1 slave does not exist; **set dS: 0230**

Changing the Custom Display Configuration

The custom display configuration can be used to show additional information on the unit price display. The additional information that can be shown includes the density, temperature, flowrate, and reset batch. This can be configured with the dc setting. Each digit corresponds to a custom display option. Setting a digit to 1, as opposed to 0, enables the custom display. The digits represent the following options:

Digit 1: Reset batch
Digit 2: Temperature display
Digit 3: Density display
Digit 4: Flowrate display

For example, the following code would enable temperature and flowrate to be shown on the custom display.

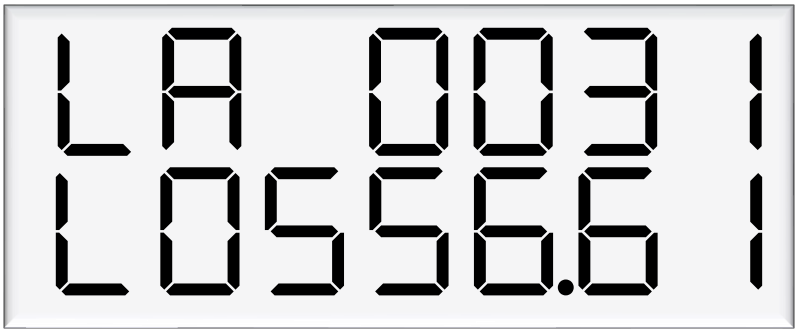


Last Sale

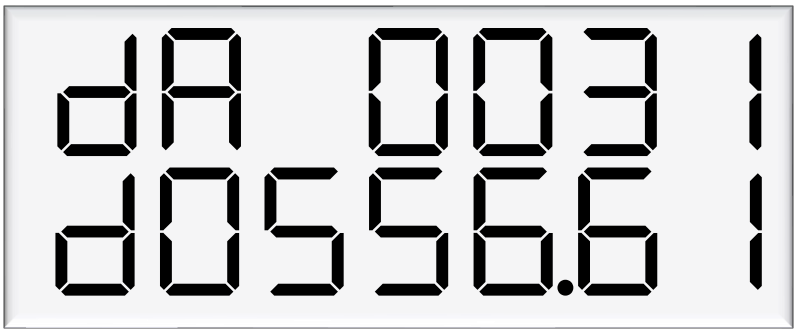
This menu is used to view the last sale details. It is only use when the dispenser is used for LPG

Electronic Totes

The dispenser records electronic totes for price and dollars. To view the electronic totes, continue pressing the parameter switch until the following display is shown:



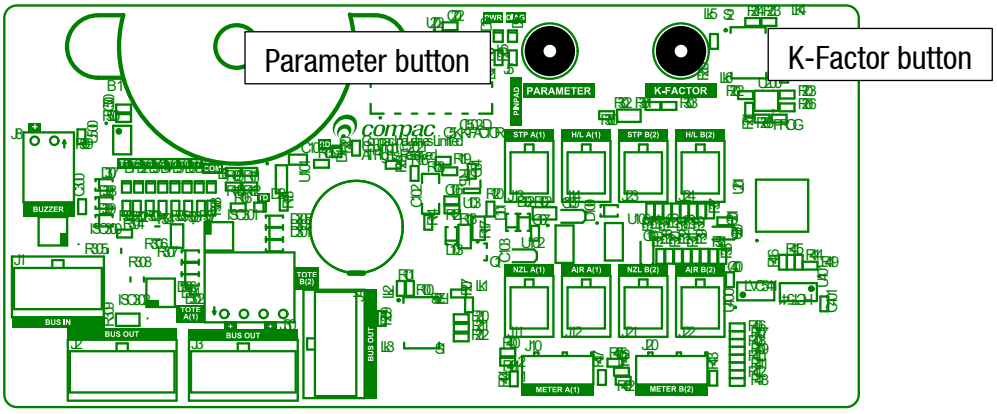
The bottom row is a continuation of the top row – for example, the above display should be read as 003 10556.6 1. The side (A or B) will be shown in the unit price display. Dollars totals are also recorded, which can be viewed by continually pressing the parameter switch.



The electronic totes can also be viewed by pressing the # key five times on the main display, as long as the unit is not in a transaction. Each tote will be shown for ten seconds before the next tote is displayed.

K-Factor Switch

The **K-Factor** switch is located on the C5000 K-factor board. It is used to access and set up options on the dispenser.



K-Factor Settings

A summary of the K-Factor settings can be seen below. Information on these settings and how to change them can be found on the following pages.

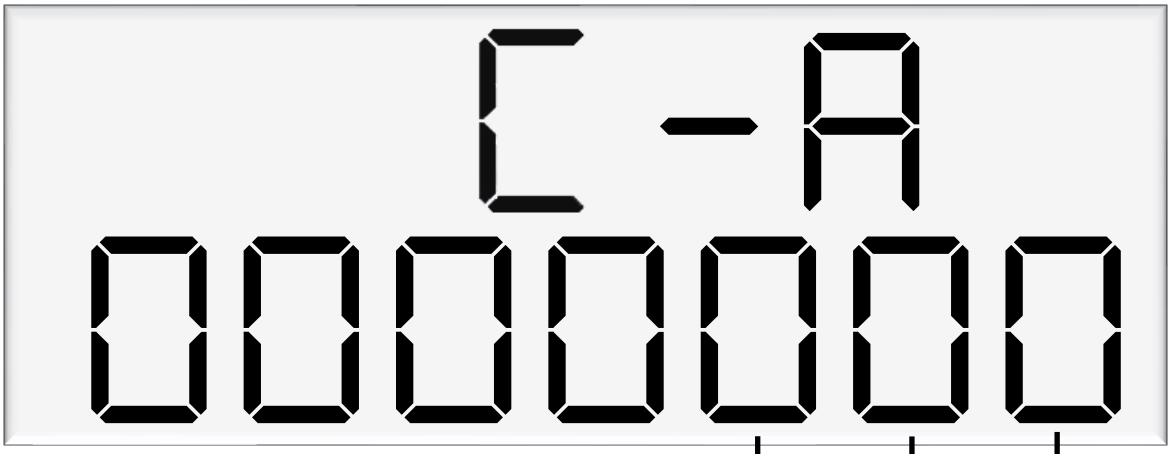
Setting	Price display	Litres display
Dispenser Hose settings	c-A or c-b	*******
Meter ID	id-A or id-b	******
Meter temperature calibration	E-A or E-b	***
Meter density calibration	d 15-A or d 15-b	****
Line Delay	LdA or Ldb	0.0
Hose	hoSE	0.00
Display setting	d iSP	000000
Maximum flow		9A **** or 9b ****

K-Factor	FA or Fb	*******
Configuration code	c	*******
Comms	cc	****
Solenoid delay		SdA *** or Sdb ***
Preset cutoff		PcA *** or Pcb ***
Preset rounding		PrLA*** or PrLb*** PrHA*** or PrHb***
Flow time out		n-A *** or n-b ***
GPIO	GP iO	****
GPIO pulse value	GP iO Pu	*****

Dispenser Settings

The following diagram displays how to change the dispenser settings, such as the meter type, variant and minimum delivery. To get to the following menu, depress the K-Factor switch once when not in a transaction. The menu shown is for side A – if side B is required, continue depressing the K-Factor switch until the same menu for side B is reached and follow the same set up instructions.

These settings will likely be set in the factory. Only change the following settings if required. See following pages for information on these settings.



Meter Settings
4 - V50 meter

Variant Settings
5 - LPG

Quantity Settings

0 - Litres uncompensated
1 - Litres compensated
2 - mass
3 - Gallons compensate
4 - Gallons uncompensated

Meter Settings

This setting corresponds to the type of meter plugged in to the dispenser. Options 1-3 are for an encoder meter and depend on the channel setting of this meter. Encoder meters are used for petrol and diesel, while V50 and KG100 meters (option 4) are used for LPG, AdBlue and LPG. Some settings (such as temperature and density calibration) are only available for V50 and KG100 meters and therefore will not appear if the correct meter type is not set

Variant Settings

This setting should be changed depending on the product. For LPG the variant needs to be set to 6.

Quantity Settings

This setting is what quantity will be shown on the main display when fuel is being dispensed. For LPG application the quantity setting needs to be set to 2 for mass.

Meter ID

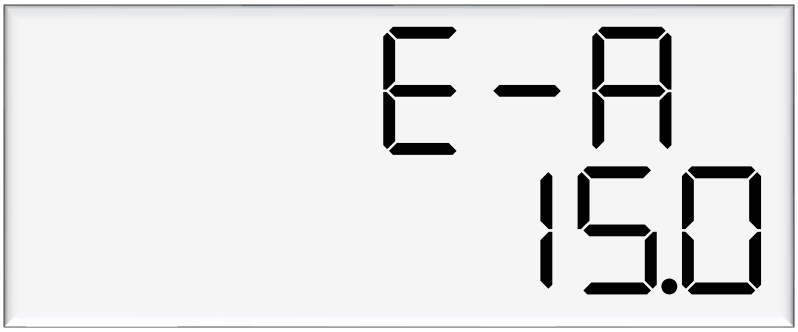
All KG100 meters have a specific ID which must match the ID recorded in the dispenser settings. This is a 6-digit number which can be found on the meter.

If the IDs do not match, the dispenser will return a cALAb error .

To set the meter id Each press of the K-Factor switch passes you over a digit, making the digit blink. Holding the switch down for more than a second changes whichever digit is currently displayed. If you want to pass over a setting without changing any digits, keep pressing and releasing the switch.

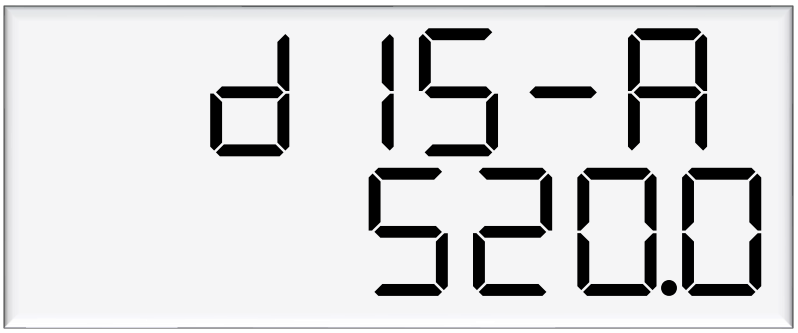
Meter Temperature Calibration

The temperature calibration can be used to adjust the temperature being retrieved from the meter, if this is not the actual temperature of the product being dispensed. The actual temperature of product being dispensed should be entered in this menu. This will be used to adjust new temperatures returned from the meter.



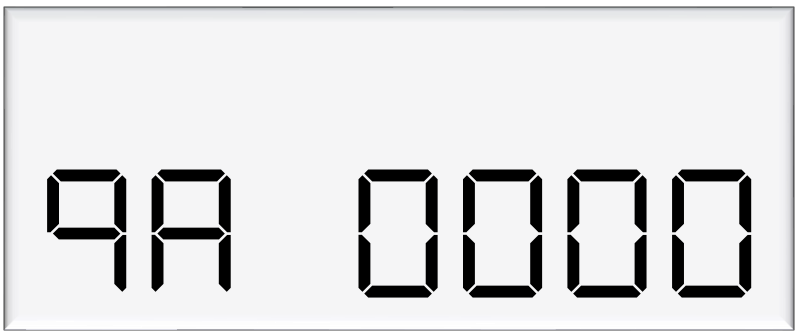
Meter Density Calibration

The density calibration can be used to adjust the density being retrieved from the meter, if this is not the actual density of the product being dispensed. The actual density of product at 15 °C being dispensed should be entered in this menu. This will be used to adjust new densities returned from the meter.

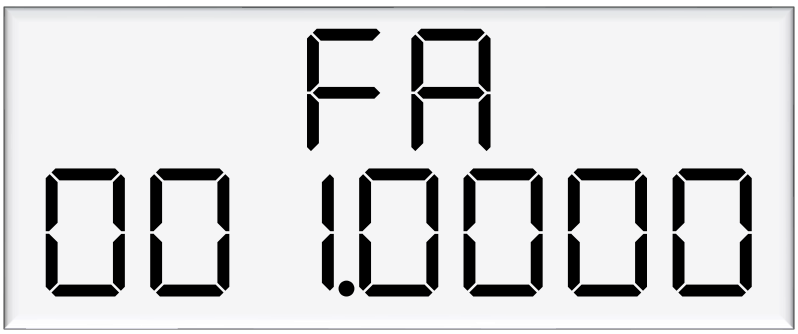


Maximum Flow

If this setting is left at 0000 the maximum flow, or Qmax, is 40 kg/minute by default. This setting is used for weights and measures.



Changing the K-Factor

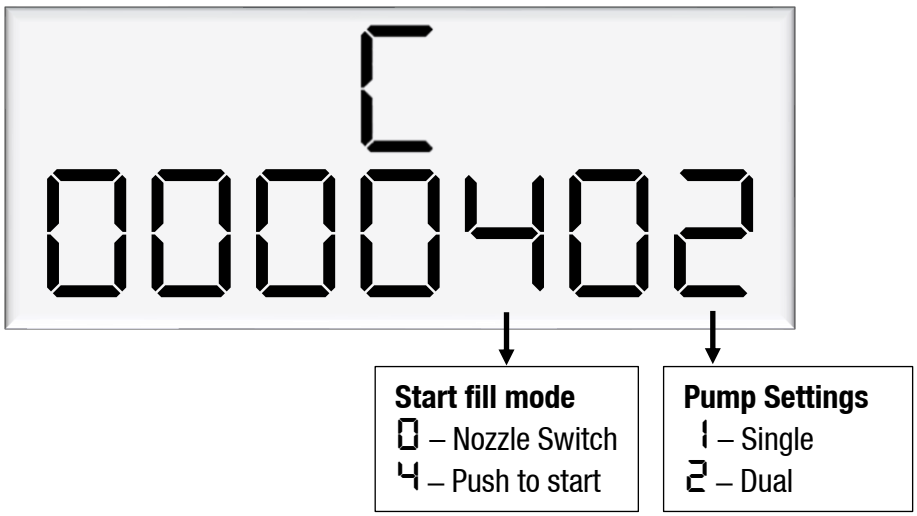


The K-Factor is used to calibrate the dispensers KG100 meter with a master meter or meter prover (Scales). See meter calibration for more details on calibrating the dispenser

C Configuration Code

The **C configuration code (C)** changes the operation of the dispenser.

The configuration code has been factory set and should not be changed. If the memory gets wiped you will need to re-enter it.



Pump settings

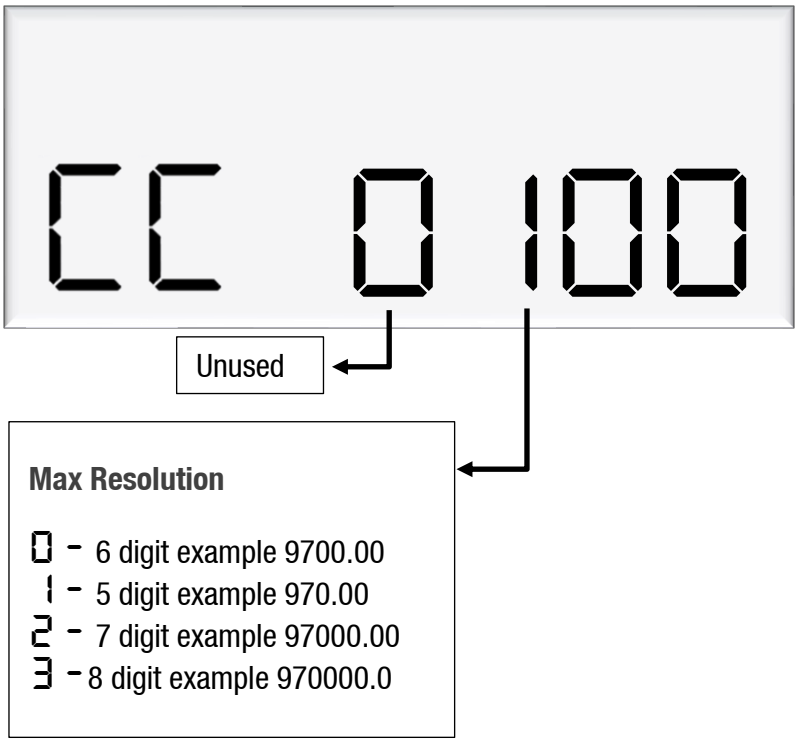
This sets the number of hoses setup in the C5000. After setting this setting the number of settings in the parameter and the K-Factor switch will change.

Start fill mode

This sets how the fill is started. If the setting is set to 0, when the nozzle is lifted the dispenser starts. If at any time the nozzle is hung the dispenser ends the fill. It the setting is set to 4, when the start button is pushed momentarily the dispenser starts the fill. To stop the fill manually when the dispenser is in this mode you have to push the stop button.

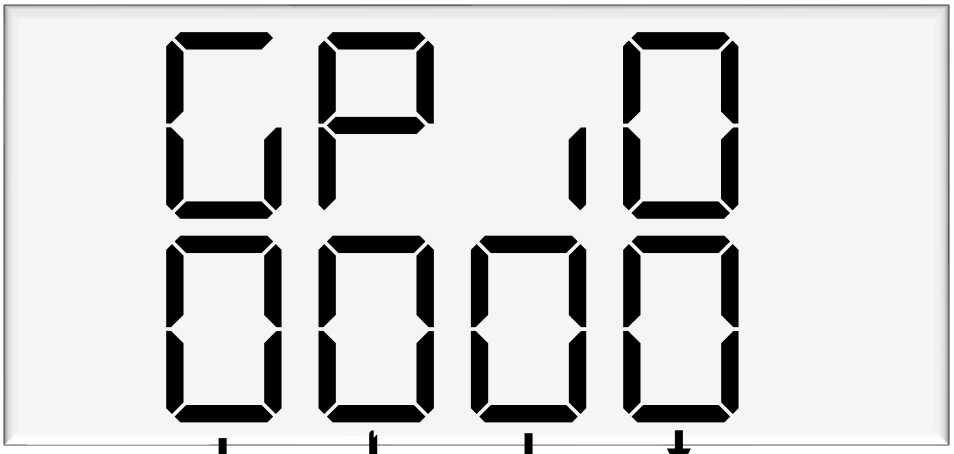
Changing COMMS

Use the following diagram to setup COMMS as required.



GPIO K Factor settings

The GPIO settings in the K factor board is where you set the GPIO specific settings. The below figure shows details of all the options available for each setting.



Duty Cycle Setting
0 - 50%
1 - 10%
2 - 20%
3 - 30%
4 - 40%
5 - 50%
6 - 60%
7 - 70%
8 - 80%
9 - 90%

Inputs Setting
0 - 1KHz
1 - 100Hz
2 - 200Hz
3 - 300Hz
4 - 400Hz
5 - 500Hz
6 - 600Hz
7 - 700Hz
8 - 800Hz
9 - 900Hz
A - 1KHz
b - 1.1KHz
c - 1.2KHz
d - 1.3KHz
c - 1.4KHz
d - 1.4KHz

Inputs Setting
0 - 0 Off
1 - 1 Channel Encoder
2 - 2 Channel Encoder
3 - 3 Channel Encoder
4 - Switch Input
5 - Remote Push to start

Output Settings
0 - 0 off
1 - Volume (Litres/Kg's)
2 - Amount (Dollars)

Remote push to start

The setting on the K Factor board to enable the remote push to start is GPIO XXX5. When remote push to start is enabled the dispenser will start a transaction when the input is pulled high for at least 0.5 seconds.

Output

The output setting enables the GPIO board to output pulses. It also sets whether the output pulses are representing volume(litre/Kg's) or amount(dollars). Majority of applications will set the pulses to represent volume

Note you cannot have meter input enabled at the same time.

Frequency

The Frequency output setting sets the maximum speed of the output pulses. The Default setting of 0 sets the frequency to 1KHz. This setting combined with the Value per pulse setting sets the maximum flow rate of the dispenser.

Example

Frequency set to 1KHz (1000 pulses/sec)
Pulses per value are set to 00001 (10ml/pulse)

That means the maximum flow rate the dispenser can do before the output pulses lag behind is

$$maximum\ flow = maxium\ frequency\ \times\ pulses\ per\ value$$
$$maximum\ flow = 1000Hz\ \times\ 10ml$$
$$maximum\ flow = 10000\ ml\ per\ second$$
$$maximum\ flow = 600\ l\ per\ minute$$

The default setting of 1KHz should be sufficient for most applications. In applications where the maximum flow rate is lower and the 3rd party controller is only able to read pulses at a lower frequency then a lower frequency output can be selected.

Note that if the flow rate exceeds the maximum pulse output the next transaction will not be allowed until the pulses have completed being outputted.

Duty Cycle

The duty cycle setting gives the ability to set the percentage of the pulse high and low. The default setting is 50%. The pulse length is determined by the following formula.

Example

Duty cycle set to 50%
Frequency set to 1KHz (1000 pulses/sec)

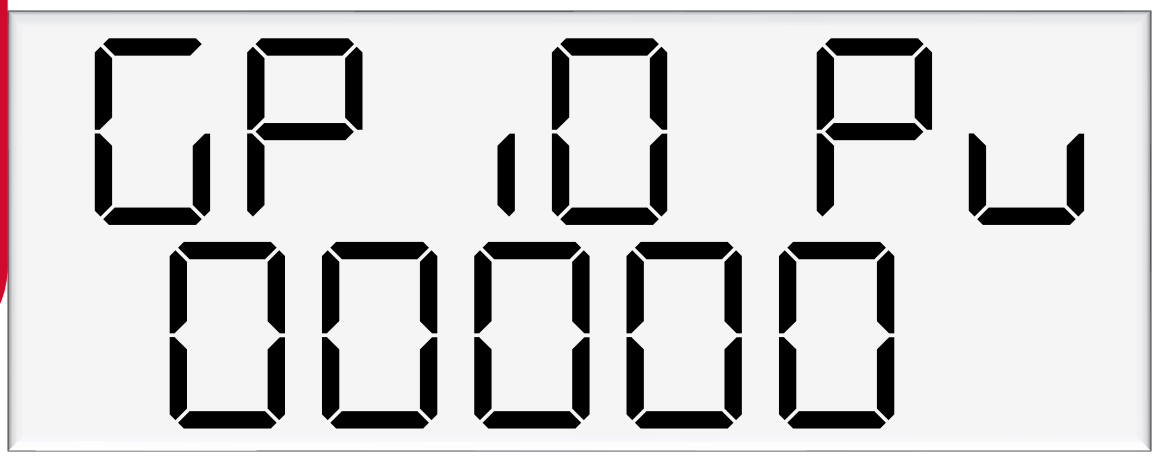
$$Duty\ Cycle = Pulse\ Width\ (sec) \times Frequency\ (Hz) \times 100$$
$$50 = Pulse\ Width\ (sec) \times 1000 \times 100$$
$$\frac{50}{100} = Pulse\ Width\ (sec) \times 1000$$
$$\frac{0.5}{1000} = Pulse\ Width\ (sec)$$
$$500\ microseconds = Pulse\ Width\ (sec)$$

The Default setting of 50% should be sufficient for most applications.

Pulse value

The pulse value setting sets what a pulse is worth. When the output is set to volume the lowest volume a pulse can be set to is 00001 which is 10 ml. If the output is set to amount the lowest amount a pulse can be set to is 00001 which is 1 cent or 0.01 dollars.

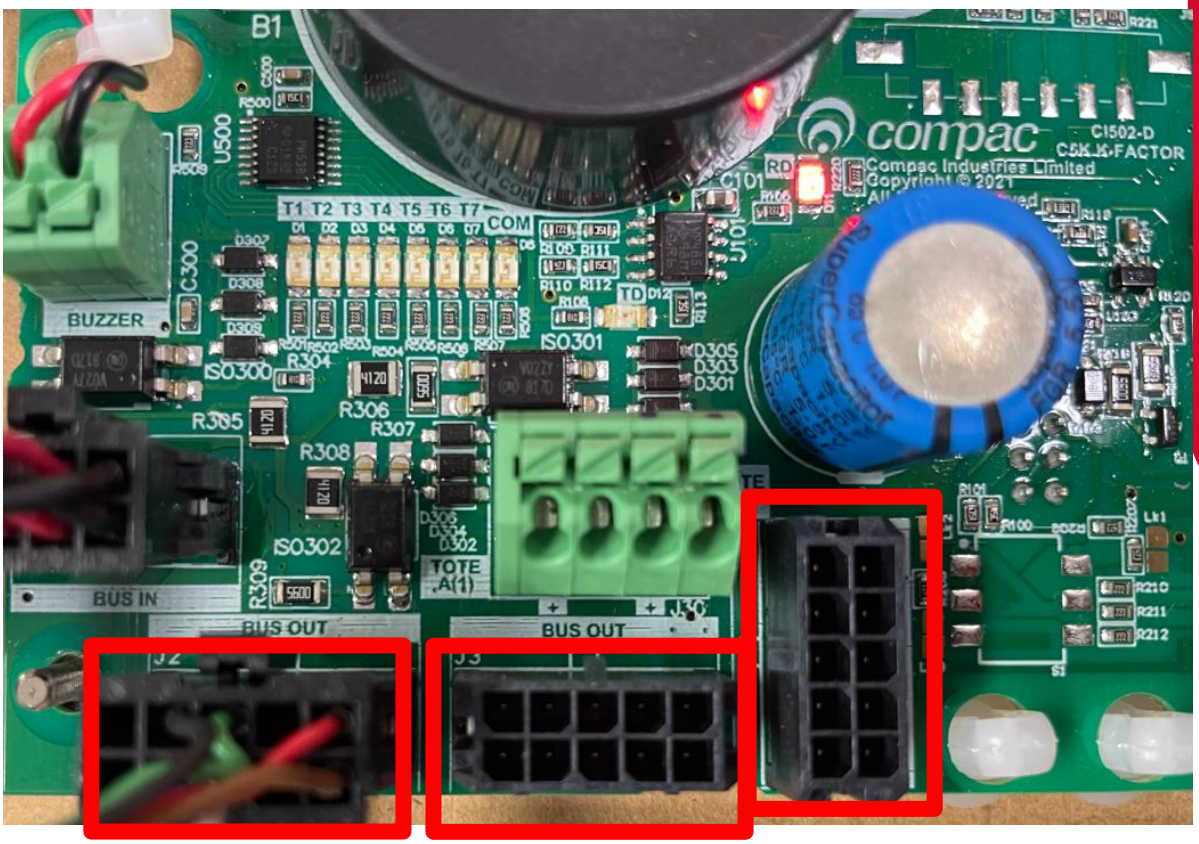
The most common setting for most applications would be 00001 or a factor of 10. Any other setting would cause an error with rounding.



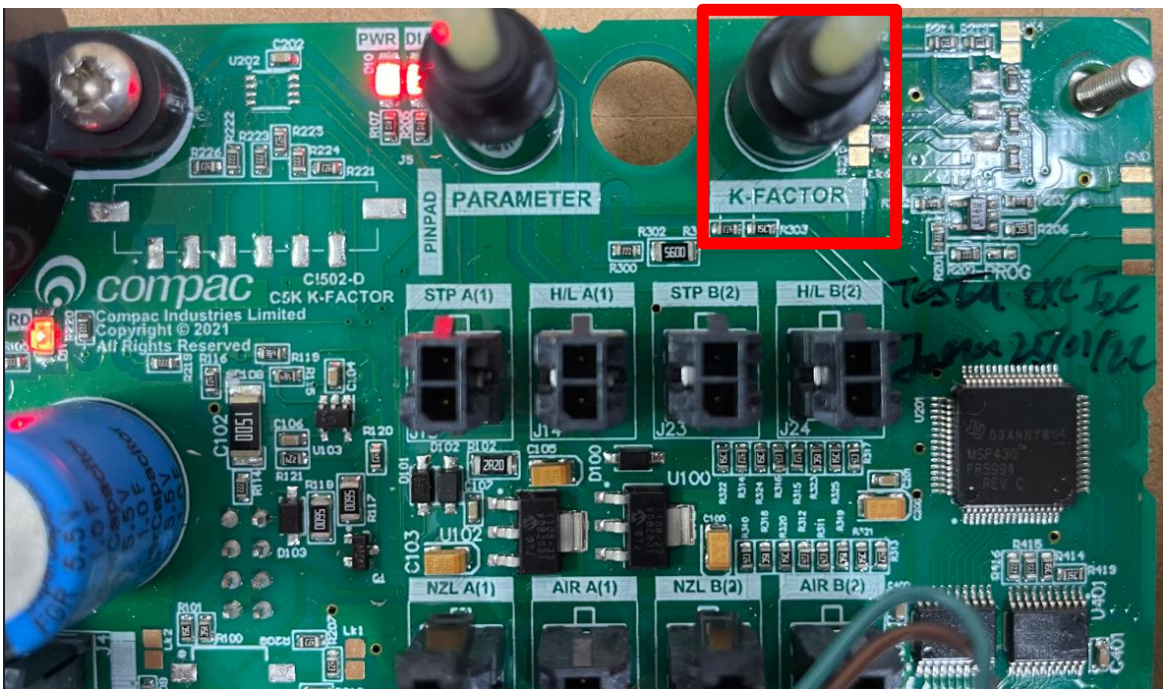
Dispenser passcode

The dispenser uses a passcode to restrict the price change function. the dispenser is setup from the factory to have the passcode 123456. The passcode must be set to 6 digits.

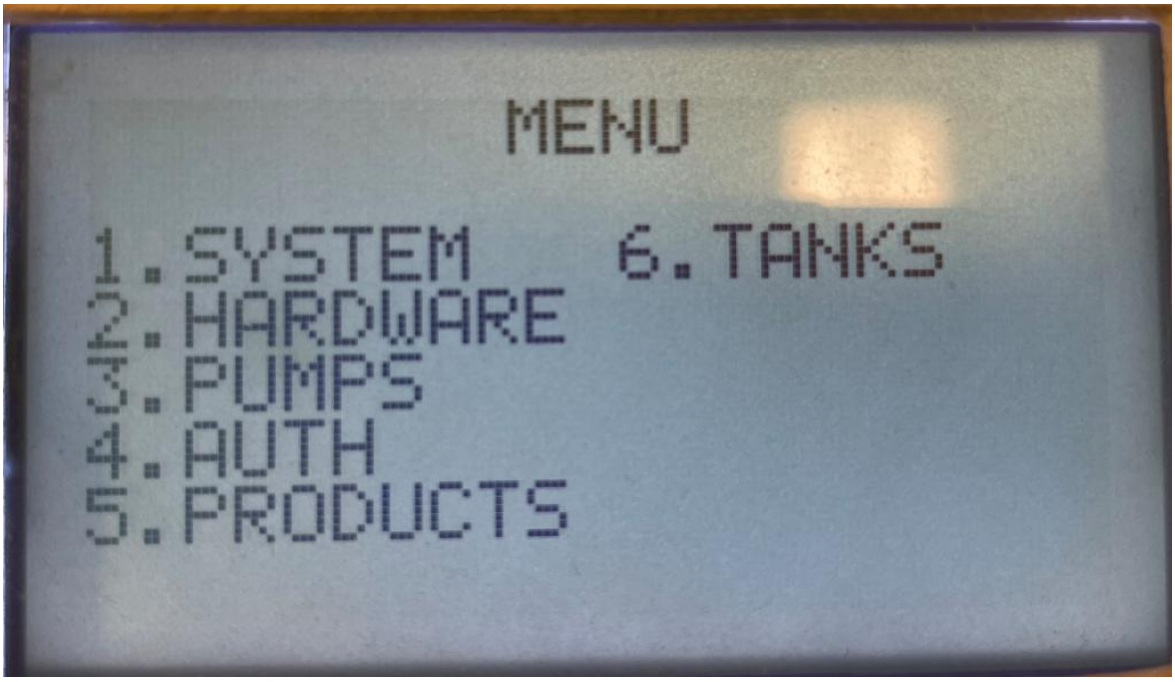
Connect the C5000 pinpad to the K Factor board. Any of the Bus out connectors



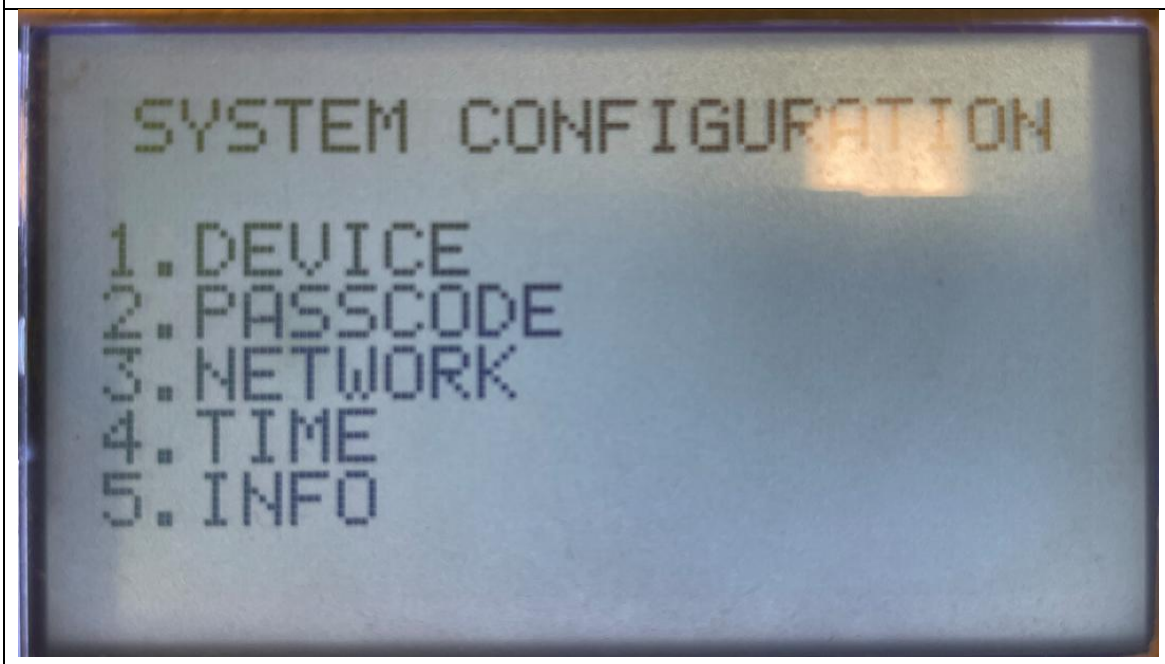
Press the K factor button on the K Factor board



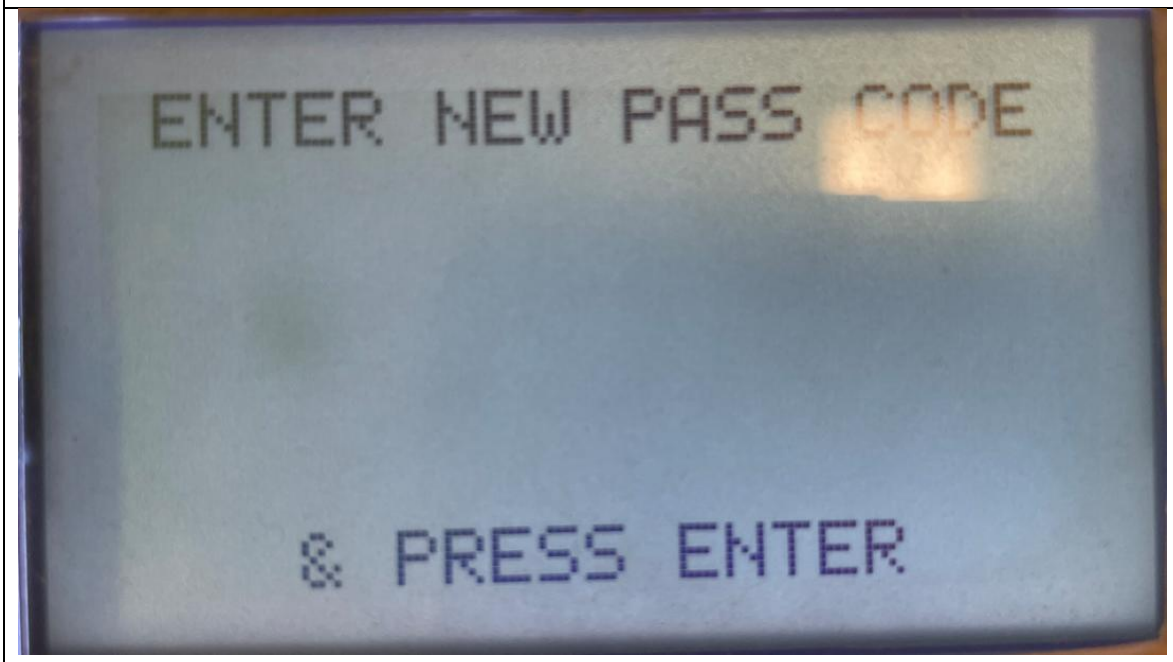
The Menu should load on the Pinpad. Press 1 for system



Then 2 for Passcode



Then enter he passcode. The passcode must be 6 digits



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. Can be reached by unscrewing the bung located on the bottom of the manifold.
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 C5000 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

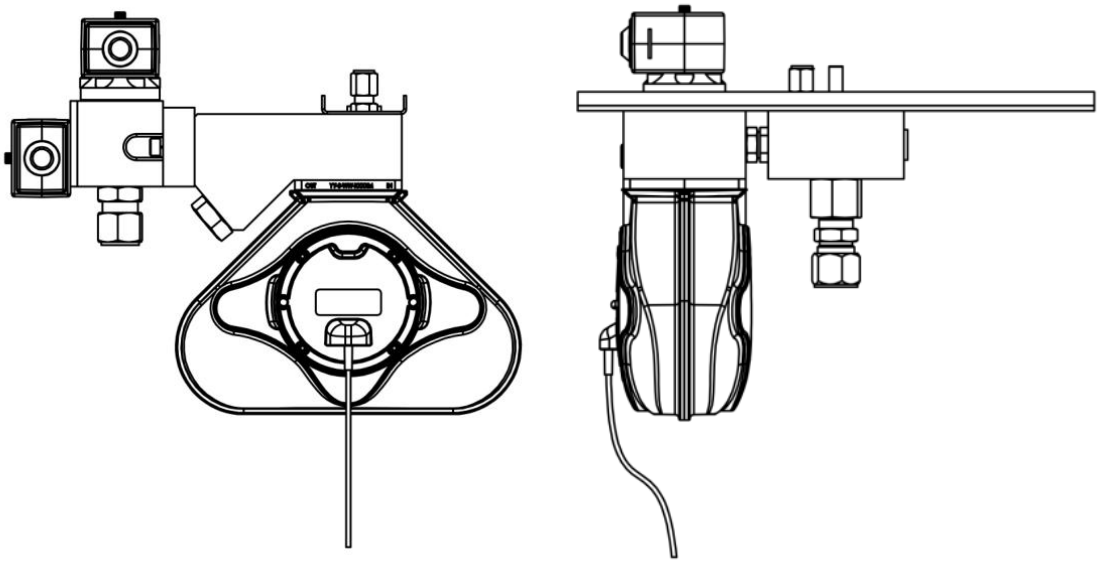
Specifications

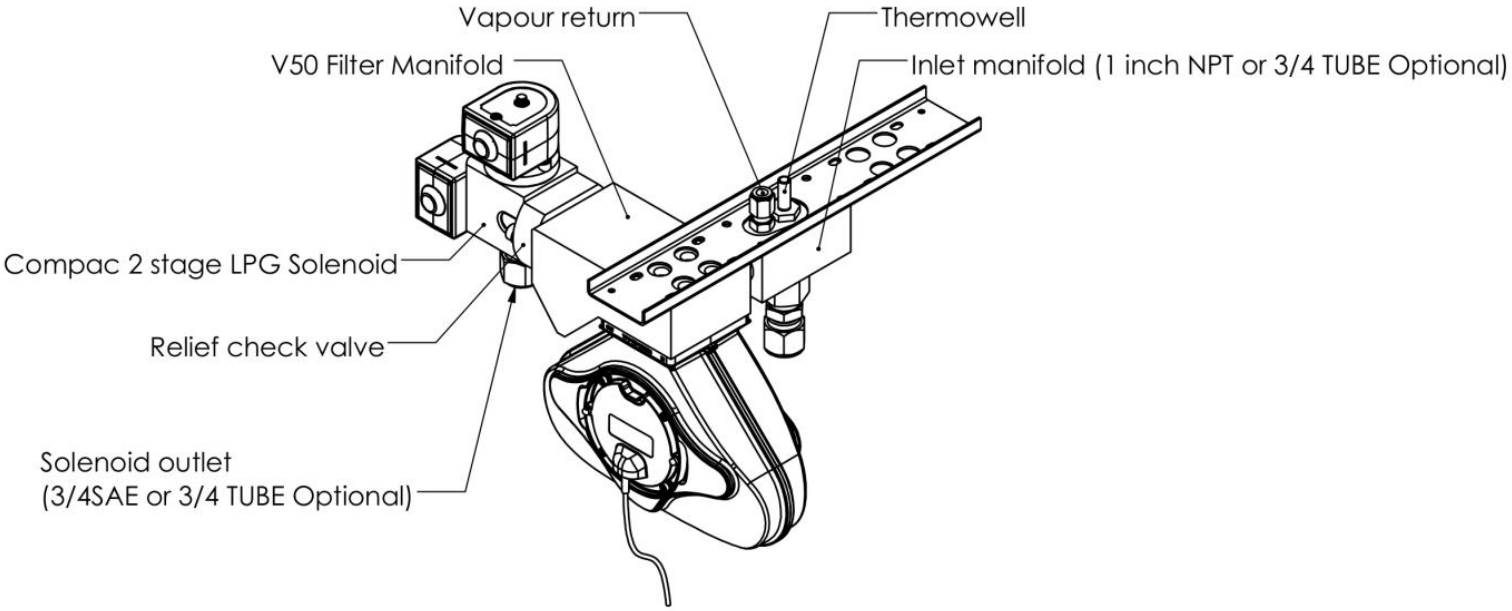
Compac's two stage LPG solenoid is designed to control the flow of LPG through the dispenser under the following conditions:

- 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





Dispenser Operation

Turning the Dispenser on

When the power is applied to the dispenser, the display will show hoLd. This start-up procedure ensures the dispenser is functioning properly before gas is dispensed.

Dispenser will be ready to use when the display indicates 0.00

Refuelling a Vehicle

Appropriate personal safety equipment should be worn whilst refuelling a vehicle.

To Refuel a Vehicle

- Press the start button or remove the nozzle from the holster to initiate a fill.
- The display will show 888888 and clear, at this point both the gas and value totals will display 0.00
- Connect the refuelling nozzle to the vehicle.
- Open the nozzle refuelling valve to commence filling.
- The dispenser will emit a long beep signalling the end of the fill, at this point the gas total.
- Close the refuelling valve.

NOTE: *Closing the valve shuts off the gas from the dispenser. It also vents the gas between the refuelling valve and coupling to the dispenser vent point.*

- Disconnect the nozzle from the vehicle.
- Return the refuelling nozzle to the nozzle holder.

Reading the Dispenser Totals

To read the dispenser totals:

- Quickly press the START button or nozzle switch five times on the side of the dispenser you wish to view the totals for. The total is 10 digits long. The four most significant digits are displayed on the top line and the number wraps to the second line showing the six least significant digits.

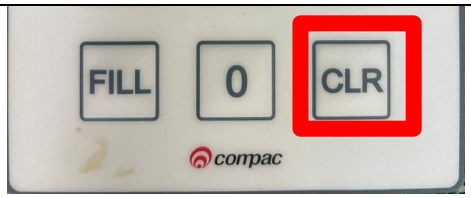
  The dispensed amount will be shown on the display for 10 seconds.
  This will be shown as:
  d Followed by a 10-digit total (e.g. d**********).

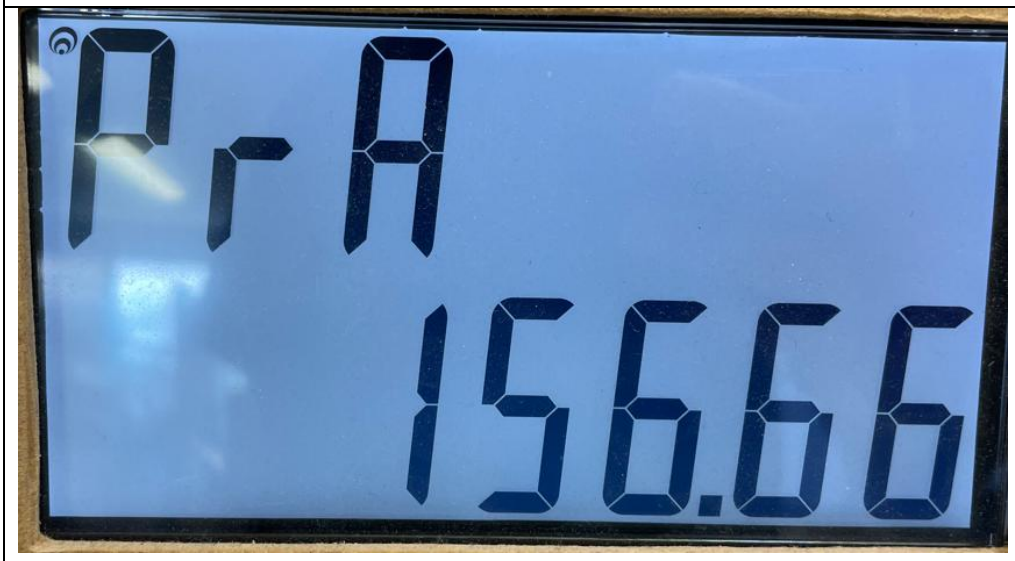
  The dispensed quantity will then be shown next and will be displayed for 10 seconds.
  This will be shown as:
  L Followed by a 10-digit total (e.g. L**********).

- Alternatively you can quickly press the CLR button on the preset keypad until the Totals are displayed on the display.

Setting the Price on the Preset keypad

To set the price using the preset keypad:

Quickly press the CLR button on the preset keypad until the Totals are displayed on the display.
 
Enter the Passcode for the dispenser. The preset keypad will beep every time a button is preset to indicate a button was pressed. ***Note the passcode will not be displayed while entering it***

After the correct passcode is entered the keypad will create a long beep and the display will show the current price per litre

Enter the new price per litre and then wait for the new price to be accepted. You will see both sides of the dispenser change price.

Servicing

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 can be reached by removing the bung on the bottom of the meter manifold (refer to Hydraulic Layout for the position of this.) 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 ay 15ºC
- Using the K-Factor switch, scroll through until the top line of the display reads d 15-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 15ºC (Volume dispensed) and compare this with the displayed Litres delivered. If the calibration is out, adjust the K Factor using the following formula: New K Factor = Existing K Factor x Volume dispensed/Volume displayed.

Master Meter Method:

- Set the temperature compensation OFF. The C configuration code should be set to c2HHH.
- 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 1ºC 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 FAXXXXX 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 ¾" 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.*

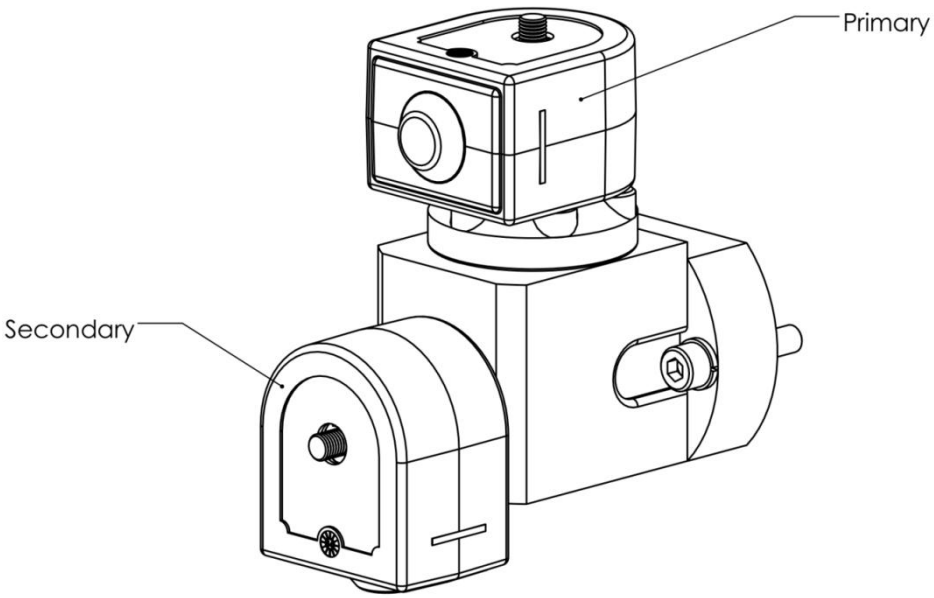
CAUTION

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.

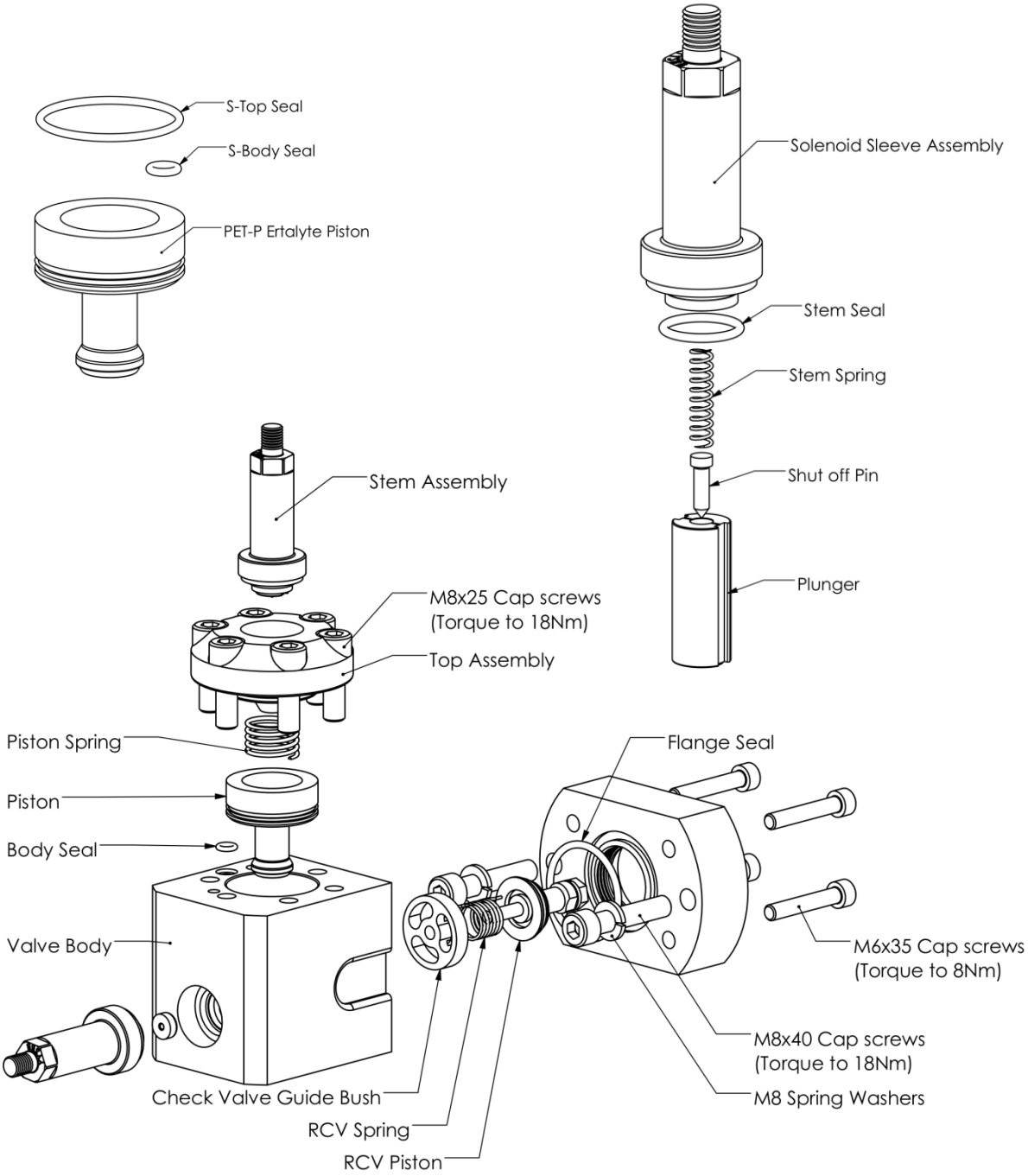
If the cover cannot be easily lifted off the body, gently tap the sides of the cover or gently pry the cover from the body with a screwdriver. Care must be taken not to damage the piston, cover or body. Piston return springs, piston assembly, and O-rings can now be removed.



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.

Power Supply Fuse Replacement

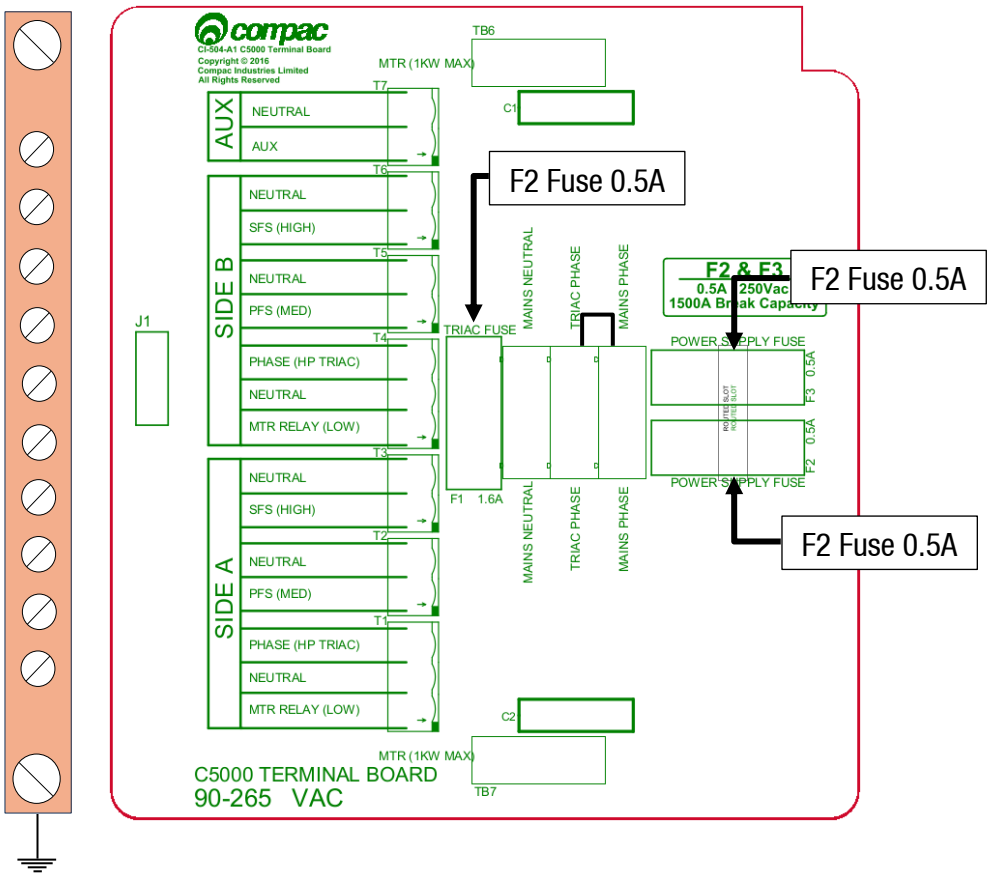
NOTE: *There are three fuses used in the C5000 Flame proof box.*

Before you start, make sure you have the following fuses with these ratings:

- F1 = 1.6 A
- F2,F3 = 0.5 A
- OR Compac fuse kit F-C5PWR-FKE

Fuse locations are displayed on the C5000 terminal board in the flameproof box.

NOTE: *Every new dispenser is supplied with one spare F1, F2 and F3 fuse, located on the inside of the flameproof box lid.*



To remove the C5000 terminal board fuse(s):

- Degas the dispenser.
- Switch off the power supply to the dispenser.

DANGER: Never remove any electrical components without first switching off the power to the dispenser. Failure to turn off the power could result in an electric shock.

- Remove the flameproof box lid.
- Remove the blown fuse and discard.

CAUTION: Take basic anti-static precautions by wearing a wristband with an earth strap.

To install the new C5000 terminal board fuse(s):

- Replace the blown fuse element with a new one of equal type and rating.

CAUTION: You must use the correct rating when replacing a fuse. The correct ratings are printed next to each fuse on the printed circuit board. Using the incorrect fuse rating may compromise the intrinsic safety of the dispenser.

- Replace the flameproof box lid, ensuring that the O-ring in the lid engages in its associated groove.
- Turn on the power to the dispenser.

DANGER: Do not power up the dispenser with the flameproof box lid removed.

NOTE: *Before replacing the lid on the flameproof box, make sure that the O-ring is not damaged and is seated properly in its groove. If the O-ring is damaged and needs replacing, replace it with an O-ring of the same size and specification (**176 N70**).*

Power Supply Replacement

Before you start, obtain the following replacement parts

- Replacement Power Supply part number **F-CP-C5K-PS**

To remove the C5000 Power Supply:

- De-gas the dispenser.
- Switch off the power supply to the dispenser.

DANGER: Never remove any electrical components without first switching off the power to the dispenser. Failure to turn off the power could result in an electric shock.

- Remove the flameproof box lid to gain access to the C5000 power supply board.

CAUTION: Take basic anti-static precautions by wearing a wristband with an earth strap.

- Undo the screws that hold the earth bar in the Flameproof box, taking care not to lose any of the spacers or other mounting hardware
- Undo the screws that hold the terminal board in the flame proof box and remove the terminal board.
- Undo the screws that hold any coms or GPIO board into the C5000 processor board.
- Undo the screws that hold the C5000 processor board in the flameproof box and remove the C5000 processor board.
- Undo the screws that hold the C5000 power supply board in the flame proof box
- Carefully slide out the C5000 power supply board to gain access to the plugs on the Com bus Cable that connects into the bottom PCB, and unplug this.

Completely remove the C5000 power supply board.

To install the new C5000 power supply:

- To install the new C5000 power supply, reverse the procedure above.

DANGER: Before replacing the lid on the flameproof box, make sure that the O-ring is not damaged, and is seated properly in its groove. If the O-ring is damaged and needs replacing, replace it with an O-ring of the same size and specification (**176 N70**).

NOTE: *It should not be necessary to recalibrate the dispenser. However, in some locations, this may be legally required as per the Calibrate the Meter section.*

Processor Board Replacement

Before you start, obtain the following replacement parts

- Replacement C5000 Processor part number **F-CP-C5K-PROCES**

To remove the C5000 processor board:

- De-gas the dispenser.
- If possible, record all the set-up data by accessing the **Parameter** switch and the **K-Factor** switch. The Software Set-Up and Upgrade section contains details on obtaining this information.
- Switch off the power supply to the dispenser.

DANGER: Never remove any electrical components without first switching off the power to the dispenser. Failure to turn off the power could result in an electric shock.

- Remove the flameproof box lid to gain access to the C5000 Processor board.

CAUTION: Take basic anti-static precautions by wearing a wristband with an earth strap.

- Undo the screws that hold any coms or GPIO board into the C5000 processor board.
- Undo the screws that hold the C5000 processor board in the flameproof box and remove the C5000 processor board.

To install the new C5000 processor board:

- Put the new C5000 board in place of the old one,

- Do up the screws that hold the C5000 processor board in the flameproof box.
- Do up the screws for any coms or GPIO board into the C5000 processor board.
- Reinstalled the lid on the flameproof box

DANGER: Before replacing the lid on the flameproof box, make sure that the O-ring is not damaged, and is seated properly in its groove. If the O-ring is damaged and needs replacing, replace it with an O-ring of the same size and specification (**176 N70**).

- Switch on the power supply to the dispenser.
- Press the K-factor button on the K-Factor board to sync the settings in the K-Factor board with the C5000 processor board
- Check dispenser operation

NOTE: *It necessary to recalibrate the dispenser.*

Dispenser Software Upgrade/Replacement

You can upgrade the dispenser software via USB Stick. Make sure the USB stick is formatted as FAT32 and has the new dispenser software loaded on it.

CAUTION: Before working on the dispenser electronics, take basic anti-static precautions by wearing a wristband with an earth strap.

To record set-up data and tote information:

- Access the K-Factor board by opening the cover behind the main display.
- Record all the set-up data by accessing the **Parameter** switch and the **K-Factor** switch. Refer to Parameter Switch Settings and K-Factor Switch Settings to obtain this information.

  The following data is required from the **Parameter** switch :
  - Dispenser pump price.
  - Dispenser pump number.
  - Dispenser Setting
  - Software Program number, if you are upgrading to a new version.

  The following data is required from the **K-Factor** switch:

- The K-Factor. There is a value for side A and side B in dual hose dispensers.
- Configuration Code C.
- The Density Factor.

- Record the tote information by pressing the nozzle switch or start button quickly five times

To install the new C5000 software

- Switch off the power supply to the dispenser.

DANGER: Never remove any electrical components without first switching off the power to the dispenser. Failure to turn off the power could result in an electric shock.

- Remove the flameproof box lid to gain access to the C5000 Processor board.
- Install the USB stick for the software that you want to install. If there is a coms or GPIO card installed on the C5000 processor board, you might have to remove it.
- Reinstalled the lid on the flameproof box

DANGER: Before replacing the lid on the flameproof box, make sure that the O-ring is not damaged, and is seated properly in its groove. If the O-ring is damaged and needs replacing, replace it with an O-ring of the same size and specification (**176 N70**).

- Switch on the power supply to the dispenser.
- The Display will display hold. The display will change from hold to calib, this mean that the software has been upgraded.
- Press the K-Factor board button on the K-Factor board to clear the caib from the display and sync the K-Factor board settings will the C5000 processor board.
- Check the dispenser operation Checking Dispenser Operation.

Unserviceable Parts List

The following parts are unserviceable on site and have to be returned to Compac for servicing.

Part	Comment
V50 Meter	The V50 meter: - Can have its firmware upgraded by approved service agents. - Can only be serviced by Compac. - Has no set-up functions. - Is self-characterising. The only function performed in the set-up is setting the K- Factor on the K-Factor Board and setting the Meter ID
C5000 Power Supply	
C5000 CPU Board	
Nozzles	
Solenoid Stem	Replacing the solenoid stem seal requires special tooling.

Dispenser Calibration

Meter Calibration

Calibrating the meter involves:

- Comparing the dispensers stated amount dispensed to actual amount dispensed.
- Adjusting the K-Factor if accuracy is not within the required tolerance.

NOTE: *The K-Factor for each new dispenser is factory set and usually does not need to be changed.*

To test the meter accuracy:

Record the dispenser's current density factor and set it to read out in kg Density Factor (dSF).

- Test the meter accuracy using Calibration Test Fill Procedure - Method 1 or Calibration Test Fill Procedure - Method 2.

To calculate the meter K-Factor:

- Make sure that the dispenser is idle.

- Press and release the **K-Factor** button on the K-Factor board until the K-Factor is displayed

Calculate the new K-Factor with the following formula:

$$New\ K\ Factor = existing\ K\ Factor \times \frac{True\ quantity}{Displayed\ amount}$$

For example:

$$Existing\ K\ Factor = 0.98$$
$$Displayed\ amount = 5.80$$
$$True\ quantity = 6.00kg$$
$$New\ K\ Factor = 0.98 \times \frac{6.00}{5.80} = 1.0138(4dp)$$

To input dispenser settings:

- Input the new meter K-factor.
- Set the density factor back to its original value. (**dSF**).

Calibration Test Fill Procedure (Method 1)

Method 1 of checking calibration involves filling a gas bottle and comparing the read-out scale reading with the dispenser display reading.

Before you start, make sure you have:

- Certified weighing scales with a read-out accuracy of +/- 20 g or better and a range of 0 – 120 kg
- A LPG cylinder with a fill and release valve

To carry out the calibration test fill procedure (Method 1):

- Put the LPG cylinder on the scales.
- Empty the LPG cylinder by venting it to the atmosphere.

DANGER: Always vent cylinders in a safe manner and safe location.

- Zero the TARE read-out on the scales.
- Fill the LPG cylinder from the dispenser.
- Compare the read-out weight (True Quantity) on the scales with the dispenser display (Display Amount).

If the results are not within 0.5% of each other, you will need to change the calibration, as per the Calculate and Set the New K-Factor section.

Calibration Test Fill Procedure (Method 2)

Method 2 of checking calibration involves filling a vessel and comparing a master meter reading with the dispenser display readings.

This method assumes that the master meter is sufficiently accurate and reliable enough to be considered a good reference.

Before you start, make sure you have:

- A master meter

To carry out the calibration test fill procedure (Method 2):

- Plug the dispenser refuelling probe into the master meter, and then plug the master meter refuelling probe into a vehicle to fill.
- Turn on the master meter valve, if applicable, and reset to zero.
- Fill the vehicle from the dispenser.
- Turn off the dispenser refuelling valve and master meter valve, if applicable.
- Compare the master meter read-out (True Quantity) with the dispenser display (Display Amount).

If the results are not within 0.5% of each other, you will need to change the calibration, as per the Calculate and Set the New K-Factor section.

Pressure Transducer Calibration

Calibrating the dispenser pressure transducers is done by setting the Pressure probe calibration points. The following procedure is how to set these points.

NOTE: *The pressure transducers are calibrated at the factory and usually do not require recalibration.*

To set pressure probe calibration points

- Degas the dispenser and close all outlet isolation valves
- Turn on the gas to the dispenser.
- Remove the nozzle from its holster or press the start button, allowing gas to pass through the dispenser.
- Slowly open the outlet isolation valve and watch as the pressure gauge begins to rise. Shut the valve when the reading is approximately 10 bar.
- Hang up the nozzle or press the stop button.
- Set the uA 1L (low pressure probe 1 calibration point)to 10. If there are 2 pressure transducers per side set uA2L (low pressure probe 2 calibration point) as well
- Remove the nozzle from its holster again or press the start button.

- Increase the gauge pressure to approximately 200 bar.
- Hang up the nozzle or press the stop button.
- Set the uA 1h (high pressure probe 1 calibration point)to 200. If there are 2 pressure transducers per side set uA2h (high pressure probe 2 calibration point) as well
- Check current calibrated pressure is the same as the Pressure gauge

Ambient Temperature Sensor Calibration

Calibrating the Ambient Temperature Sensor involves:

- Comparing the dispensers stated temperature to the actual temperature.
- Adjusting the ambient temperature reading if it is found to be incorrect.

To test the sensor accuracy:

Using a calibrated temperature meter, determine the temperature of the body of the dispenser Ambient temperature sensor.

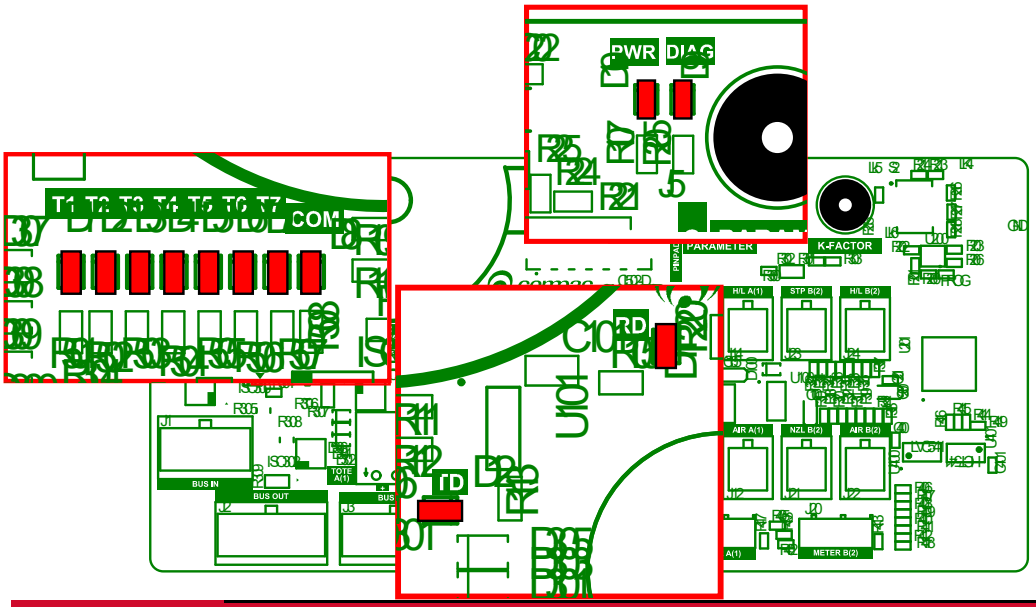
Access the current dispenser ambient temperature reading.

To adjust the dispenser reading:

Adjust the dispenser's ambient temperature reading to match that of the calibrated temperature meter.

Indicator LEDs

LED indicators are used to provide power, output status, and diagnostic information.



Indicator LEDs	LED	Reference	Description
	Power	D10	Indicates power is being supplied to the k-Factor a board. If it is not lit there could be no power or there is a problem with the combus cable
	RD	D11	Flashes when receiving Combus messages. This indicates the C5000 processor is sending messages to K-Factor board
	TD	D12	Flashes when sending messages on the Combus
	Diag	D9	Provides diagnostic information (see below).

Diagnostic LED	The diagnostic LED D9 flashes in 2 different states when the processor is working properly, as outlined in the table below.		
	State	**LED Flashes**	**When**
	1	Slowly	The hose is idle and in stand-alone mode.
	3	Quickly.	The start button is being pressed or the nozzle has been lifted from its holster.

Appendix

The C5000 is ATEX approved for use in a Class 1, Zone 1 hazardous area. Dispensers are wired to Class 1, Zone 1 Australian and European standards.

Approval numbers appear on labels attached to the C5000 and the flameproof junction box lid.

ATEX Approval Marking on the Equipment	Equipment or Protective System	EC - Type Examination Certificate Number
IECEx TRA 17.0002X	C5000 Power Supply	Ex db [ib] IIA T4 Gb (-40°C ≤ Ta ≤ +65°C)
IECEx ExTC 18.0011X	C5000 K-Factor Display	Ex ib IIA T4 Gb -40°C ≤ Tamb ≤ +70°C
IECEx ExTC 18.0016X	C5000 Compac Coriolis Meters - V50 and KG100	Ex ib IIA T4 Gb -40°C ≤ Tamb ≤ +70°C
IECEx ExTC 19.0010X	C5000 TP Slave Display	Ex ib IIA T4 Gb Tamb = -40°C to +70°C

Specifications

Model Specifications

There are various LPG Dispenser models and options available.

The models include:

- Legend frame or Laser frame.

The options include:

- One, two or three lines.
- Single or dual hose.
- Fixed pressure final cut-off or temperature compensated final fill cut-off.
- Standard, high or ultra-high flow.

Model Numbers		Standard	High Flow	Ultra-High Flow
Laser	**Single**	L-LPG15	L-LPG50 L-LPG50-15	L-LPG80 L-LPG80-15
	Dual	L-LPGD15	L-LPGD50	L-LPGD80
Legend	**Single**	LGDLPG15	LGDLPG50 LGDLPG50-15	LGDLPG80 LGDLPG80-15
	Dual	LGDLPGD15	LGDLPGD50	LGDLPGD80
		LE3KG25D (Pakistan only)		

Technical Specifications

Operating Conditions:

Compac LPG Dispensers (excluding hose assembly) are designed to operate within the atmospheric environment. Gas parameters are outlined below.

LPG Dispensers require the following operating conditions:

LPG Dispensers require the following operating conditions:		
	Air temperature range	- 25 °C to + 55 °C
	Air humidity range	10% to 95%
	Gas type	High pressure natural gas (LPG)
	Gas temperature	- 40 °C to + 80 °C (continuous) - 55 °C to + 80 °C (intermittent)
	Maximum water Dew Point	- 32°C at 250bar
	Maximum Working Pressure (Inlet)	275bar (350 bar option)
General Specifications	Power Requirements	230V +/-10%, 50Hz, 2A

Specific Specifications	Standard Model	High-Flow Model	Ultra-High-Flow Model
Flow (The maximum flow rate is not only determined by the type of dispenser but also depends on the size of the refuelling hose, the model of the breakaway, the type of refuelling nozzle, and the vehicle coupling.)	1 – 15 kg /min	1-50 kg /min	1 – 80 kg /min
Pressure rating (350 bar options utilise air actuated valves and require a compressed air supply.)	275 bar (350 bar option)	275 bar (350 bar option)	350 bar
Accuracy	+/- 1.0%	+/- 1.0%	+/- 1.0%
Meter	Compac KG100 coriolis mass flow	Compac KG100 coriolis mass flow	Compac KG100coriolis mass flow
Internal Pipework	1/2”	1/2”	1/2” or 3/4"
Refuelling hose	3/8”	1/2”	1/2” or 3/4"
In-line breakaways	Various available	Various available	Heavy duty
Refuelling valve	NGV1 or NZ 7/16" probe	NGV1 or NGV2	NGV2
Laser (without hoses or high masts)	830W x 450D x 1608H	830W x 450D x 1608H	830W x 450D x 1608H
Legend (without hoses)	850W x 425D x 2355H	850W x 425D x 2355H	850W x 425D x 2355H
Minimum flow cut off	0.5 -10 kg/min (settable)	0.5 -10 kg/min (settable)	0.5 -10 kg/min (settable)
Maximum flow cut off	10 - 99 kg/min (settable)	10 - 99 kg/min (settable)	10 - 99 kg/min (settable)

Component Specifications

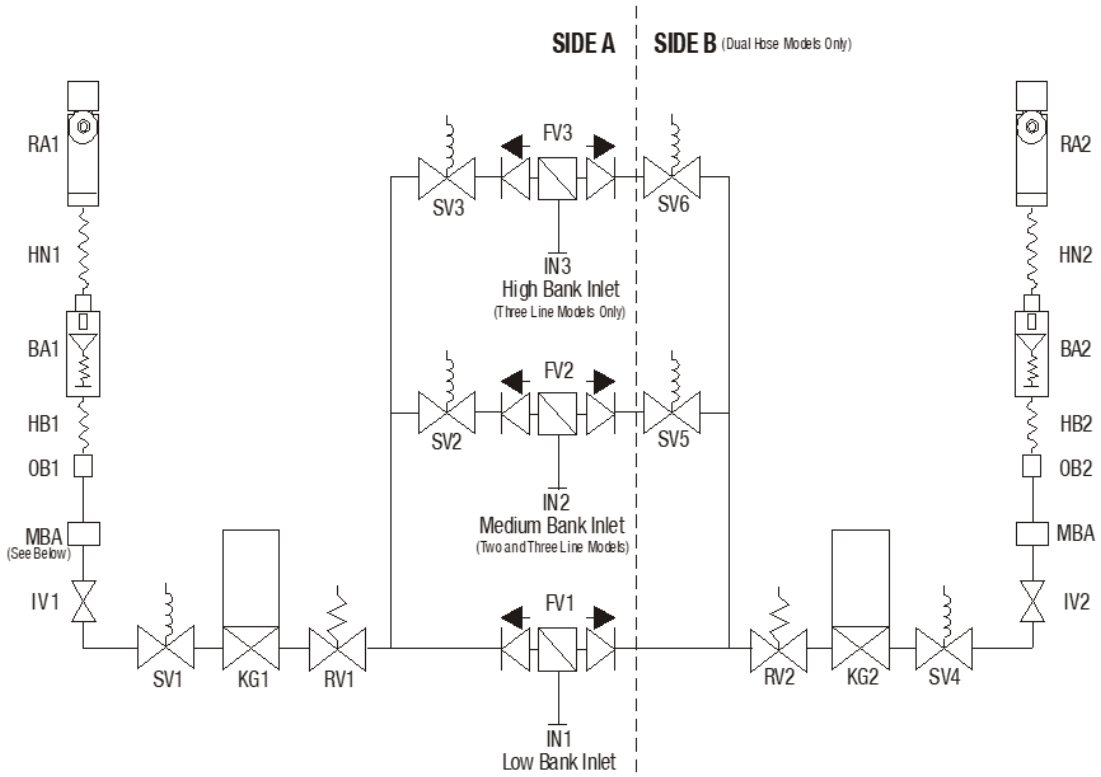
See below for information on serviced equipment.

Equipment Item	Compac Code	Specifications	Description
Coalescing filters		Grade 10 Coalescing Filter	The coalescing filters are designed to trap dirt, moisture, oil, and other debris that may damage the valve seals. A Grade 10 coalescing filter will remove 95% of liquid aerosols in the 0.3 to 0.6 micron range.
Compac filter/check valve	FCVCI-12-SS	3/4” SAE female inlet. 2 x 3/4” SAE female outlets. 350 bar max.	The filter/check valve prevents back-flow from the high storage to the medium and low storage, and from the medium storage to the low storage. The valve has a metal to metal seat and should not leak or require servicing.
Solenoid valve	SCI-12-SS	3/4” SAE female inlet. 3/4" SAE female outlet. 275 bar max.	The high flow solenoid valve is designed to control the flow of gas in a LPG Dispenser. Between the inlet and outlet, the valve opens with a differential pressure of more than 275 bar.
Regulator valve	RCI-12-SS	3 x 3/4" SAE female inlets. 3/4" SAE female outlet. 275 bar max.	The regulator is a high flow valve, designed to limit the outlet pressure of the dispenser. In the **fixed pressure dispenser**, the regulator limits the final fill pressure to 200 bar. In the **temperature compensating dispenser**, the regulator acts as a safety device to limit the amount of over-pressure if the main solenoid fails to shut off at the correct pressure.

Equipment Item	Compac Code	Specifications	Description
Three-way refuelling valve	RVCI-04	1/4" NPT ports 250 bar max.	The three-way valve is designed specifically for refuelling LPG vehicles. The inlet, outlet, and exhaust ports are designed to be used as shown in the figure in the Dispenser Component Location section. Do not re-pipe the valve in a different configuration.
Nozzles	7/16" NZ Probe 1-15 kg/min	1/4" NPT port.	In New Zealand, the probe complies with NZS 5425.1. In Australia, the probe complies with AS/NZS 2739.
	OPW CT1000 1-50 kg/min	9/16" SAE inlet port 200 bar max.	Nozzles allow refuelling for high pressure NGV applications.
	OPW CT5000 1-80 kg/min	7/8" SAE inlet port 250 bar max.	Nozzles allow refuelling for high pressure NGV applications.
Inline breakaways	QBCI-09 1-15 kg/min	9/16" SAE inlet & outlet ports	Brass inline breakaway with reconnectable design.
	OPW ILB- 1 1-50 kg/min	9/16" SAE inlet & outlet ports. 250 bar max. 150 to 200 lbs. (668 to 890 N) breakaway force.	Inline breakaway with reconnectable design. Corrosion-Resistant with high flow for all NGV-1 nozzles.
	OPW ILB-5 1-80 kg/min	7/8" SAE inlet & outlet ports. 310 bar max. 150 to 200 lbs. (668 to 890 N) breakaway force.	Inline breakaway with reconnectable design. Corrosion-Resistant with high flow quick fuelling of large storage vehicles.
Isolation ball valve			Parker 2-way 8 series ball valve

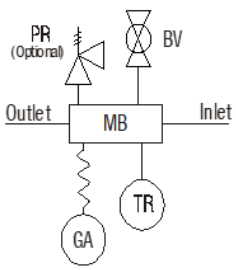
Equipment Item	Compac Code	Specifications	Description
Display	GD1, GD2 or GD3		The display has six 1" digits for price, six 1" digits for quantity and four 3/4" digits for unit price. (Available with one, two or three unit price displays.)
Pressure Gauge			Dual scale pressure gauges are available with psi and either bar, MPa, or kPa. CE Approved
Hose		Parker single and twin line hose. 3/8", 1/2" or 3/4".	The hose is specifically designed to dissipate static electrical build-up and wear resistance. Each hose assembly must be properly grounded. The temperature range for the hose is -40 to +66°C.

Hydraulic Layout



FV	Filter Check Valve	OB	Outlet Block
SV	Solenoid Valve.	HB	Hose from Outlet to Breakaway
RV	Regulator Valve	BA	Inline hose breakaway coupling
KG	KG80 Mass Flow Meter	HN	Hose from Breakaway to Nozzle
IV	Isolation Valve	RA	Refueling Nozzle Assembly

MBA
Manifold Block Assembly



MB	Manifold Block	
GA	Pressure Gauge	
TR	Pressure Transducer	(Temperature compensated models only)
PR	Pressure Relief Valve	
BV	Bleed Valve	

Dispenser Fittings

Aside from some NPT fittings located in the utility manifold, all fittings used in a Compac LPG Dispenser are SAE. Some SAE fittings are adjustable to allow for rotational positioning of components such as solenoids. Nipples, tees, and elbows are used, but the procedure is the same for each.

Fitting replacement and servicing:

When replacing, disassembling or tightening fittings:

1. De-gas the dispenser
2. Switch off the power supply to the dispenser.

DANGER: *Never remove any electrical components without first switching off the power to the dispenser. Failure to turn off the power could result in an electric shock.*

3. Make sure that your work area (including the vice, workbench, tool storage area, and floor) are totally clean of particles or previous work. Cleanliness and correct assembly practice can avoid most seal problems.
4. Make sure that the gas inlet pipes are properly supported before connection.
5. Refer to one of the following procedures, depending on the fitting that you are using:

    - Connect Threaded SAE Fittings
    - Connect Adjustable threaded SAE Fittings
    - Connect Compression Fittings

Connecting SAE Fittings

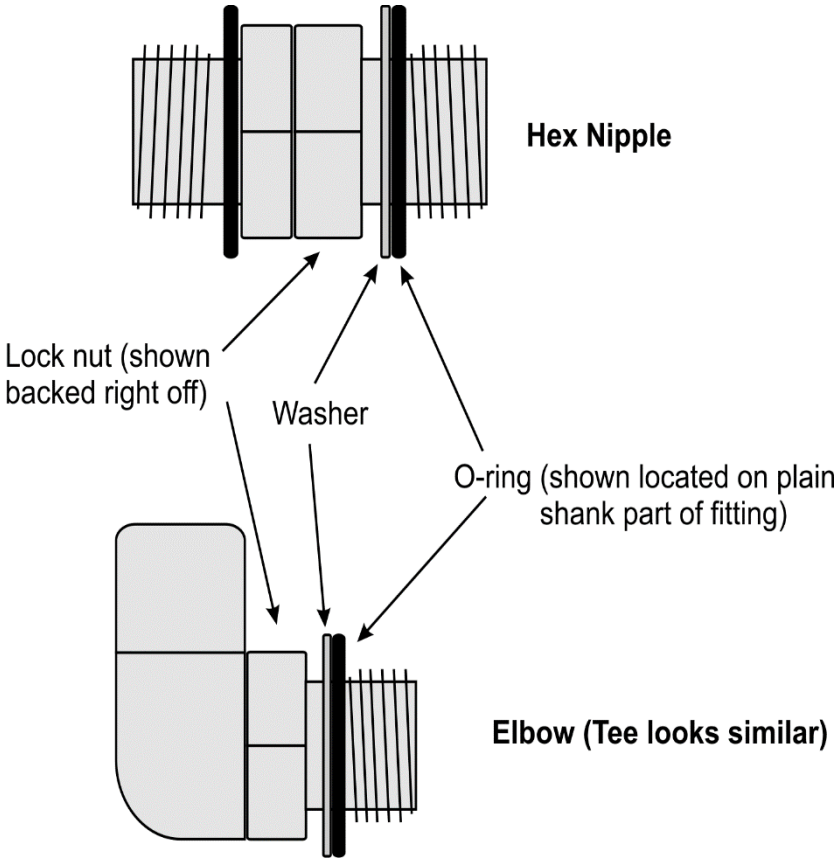
1. Inspect the components ensuring that the threads and sealing faces are clean and undamaged.
2. Lubricate the O-ring with a light oil.
3. Screw the components together by hand until the O-ring touches the face of the port.
4. Tighten the fitting firmly with a suitable spanner.

CAUTION: *Never use thread tape on SAE parallel fittings.*

Connecting Adjustable SAE fittings

1. Inspect the components ensuring that the threads and sealing faces are clean and undamaged.
2. Lubricate the O-ring with a light oil.
3. Back off the lock nut fully so that the O-ring and washer are on the plain shank of the fitting.
4. Screw the components together by hand until the O-rings touch the faces of the ports.
5. Position the components to the desired alignment.
6. Hold the fitting in position and firmly tighten the lock nut.

CAUTION: *Never use thread tape on SAE parallel fittings.*



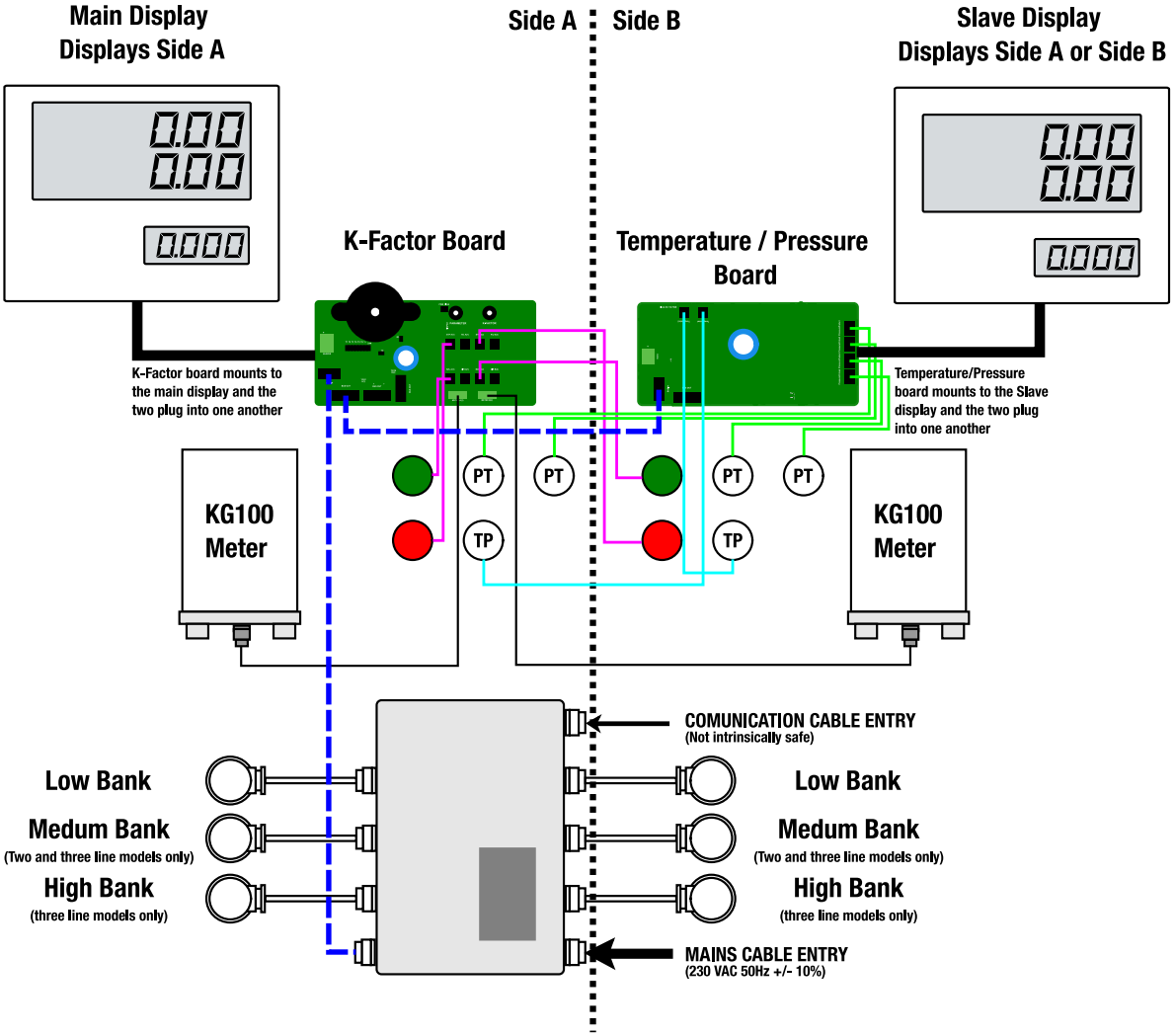
Connecting Compression Tube Fittings

1. Ensure the end of the tube is square, not deformed, clean and free from burrs inside and out.
2. Remove the nut from the fitting and ensure the two ferrules are present and correctly orientated.
3. Replace the nut and insert the tube ensuring it is located hard up against the internal shoulder of the fitting.
4. Pre-swage the tube by tightening the nut by hand and then a further 1 1/4" turns.
5. Disassemble the fitting and inspect the pre-swaging. The ferrules should square and unable to be removed from the tube.
6. Reassemble the fitting, tightening it by hand and then a further 1/4" turns with the appropriate spanner.

NOTE: *Correctly made tube should not need to be sprung into position.*

Electrical Drawings

LPG Dispenser Electrical Schematic

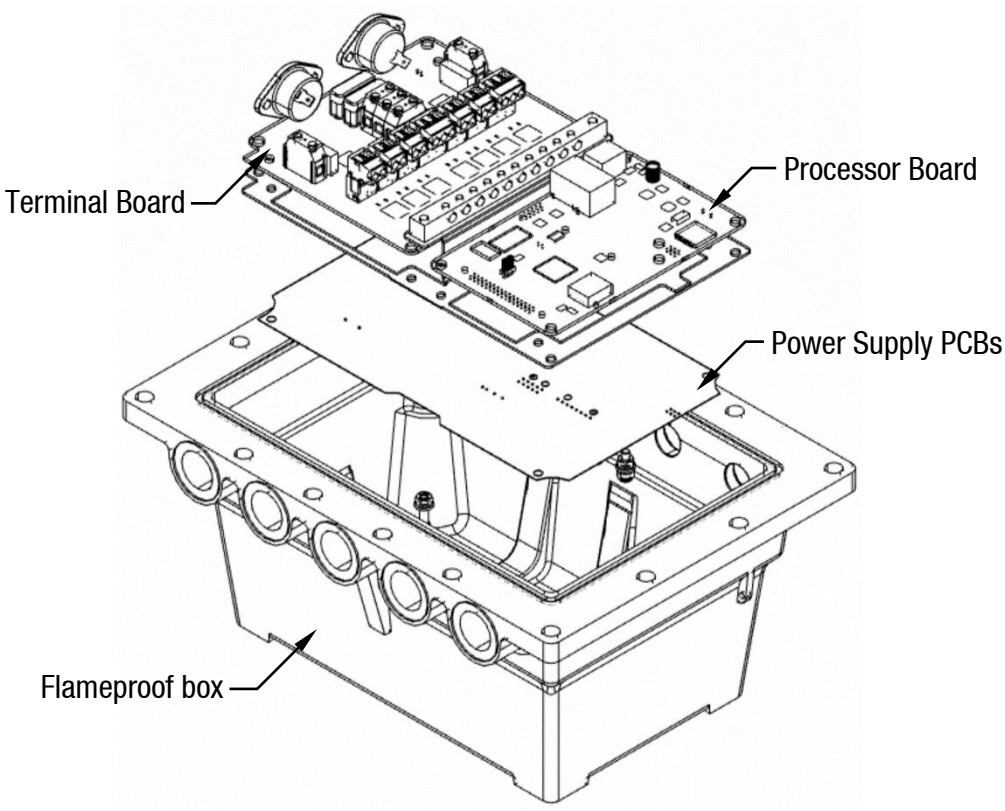


- Push to start button
- Stop button button
- Solinond coil
- PT Pressure transducer
- TP Temperature probe

- Intrinsically safe Combus cable
- Start and Stop Cable
- Pressure Transducer cable
- Temperature probe cable

Power Supply

The C5000 power supply is found within the flameproof box, located on the unit. The power supply contains the processor board and the terminal board.

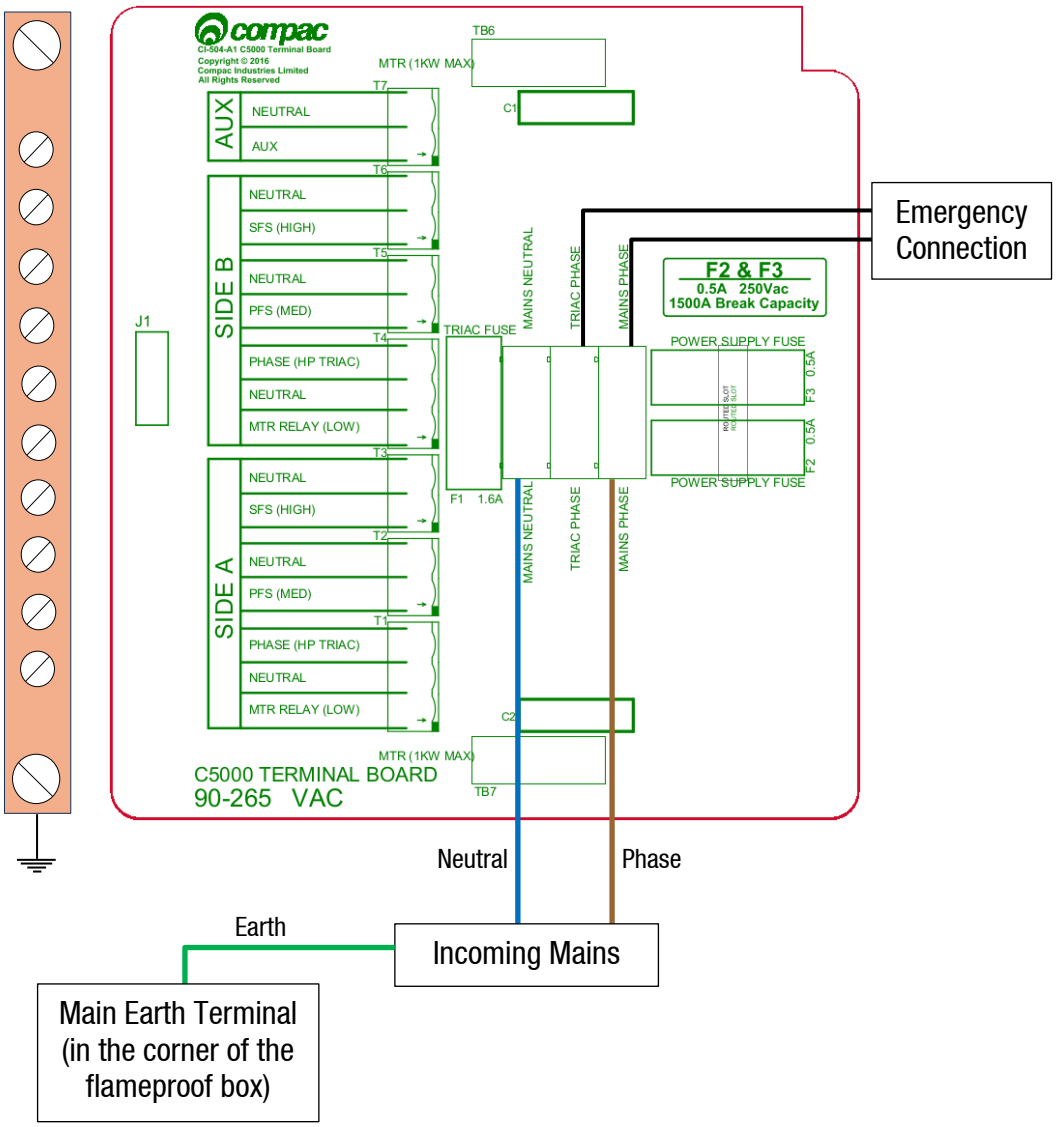


Incoming Mains

Incoming mains connections should be brought in to the terminal board.

An emergency stop connection, if desired, can also be wired into the terminal board, shown below. This will be in place of the normal loop between the triac and main phases. Wires have standard colours which are shown. In case these are unclear, the colours are as follows:

- Incoming mains phase: Brown
- Incoming mains neutral: Blue
- Incoming mains earth: Green/Yellow



Solid State Relays (Triacs)

There are 7 separate solid state relays (small triacs) on the C5000 terminal board. The output terminals for these triacs are T1 to T7. See below for information about the use of these outputs.

Power Terminal	Function
T1	Solenoid Low Bank Side A
T2	Solenoid Medium Bank Side A
T3	Solenoid High Bank Side A
T4	Solenoid Low Bank Side B
T5	Solenoid Medium Bank Side B
T6	Solenoid High Bank Side B
T7	Auxiliary Output for Fill Active

Auxilliary Output for Fill active and Beacon lights

In Single Hose LPG Dispensers, the 230V low current output T7 is turned ON for the duration of the fill.

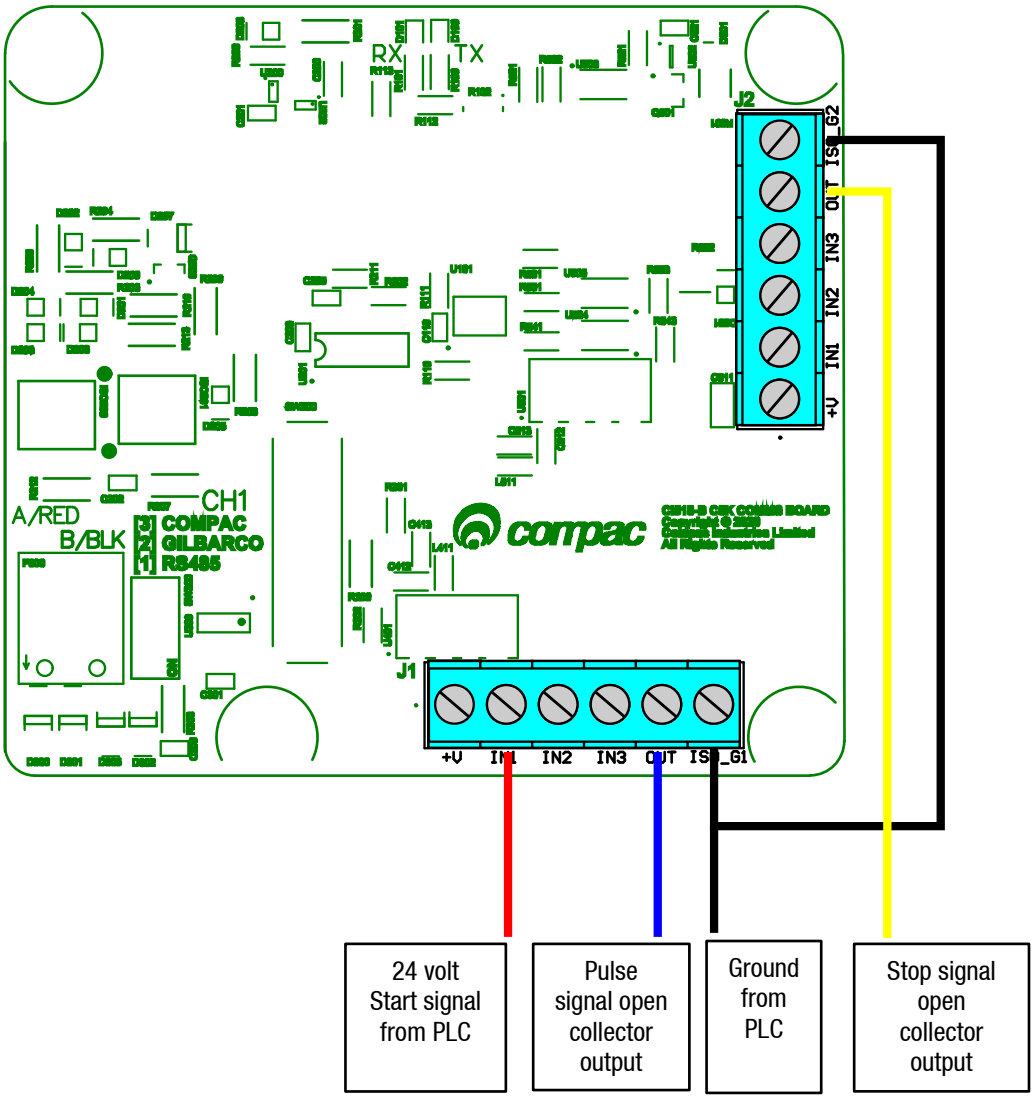
This can be used to switch a contactor or relay to operate an external light to indicate a fill is in progress (example a Beacon Light)

GPIO wiring for remote push to start

In this application the start signal will wire to IN1 terminal on the J1 connector. The signal from the PLC should be at least a 0.5 second 3 to 24 volt DC pulse.

The end of fill indicator is wired to the OUT terminal on the J2 connector. This is an open collector output. Depending on the PLC you might have to install pullup resistors on the input to the PLC.

The Output pulse signal is to be wired to the OUT terminal on the J2 connector. Like the end of fill indicator, the output is and open collector.


RX
TX
J2
+V
IN1
IN2
IN3
OUT
ISO_G2
CH1
A/RED
B/BLK
[3] COMPAC
[2] GILBARCO
[1] RS485
compac
J1
+V
IN1
IN2
IN3
OUT
ISO_G1
24 volt Start signal from PLC
Pulse signal open collector output
Ground from PLC
Stop signal open collector output

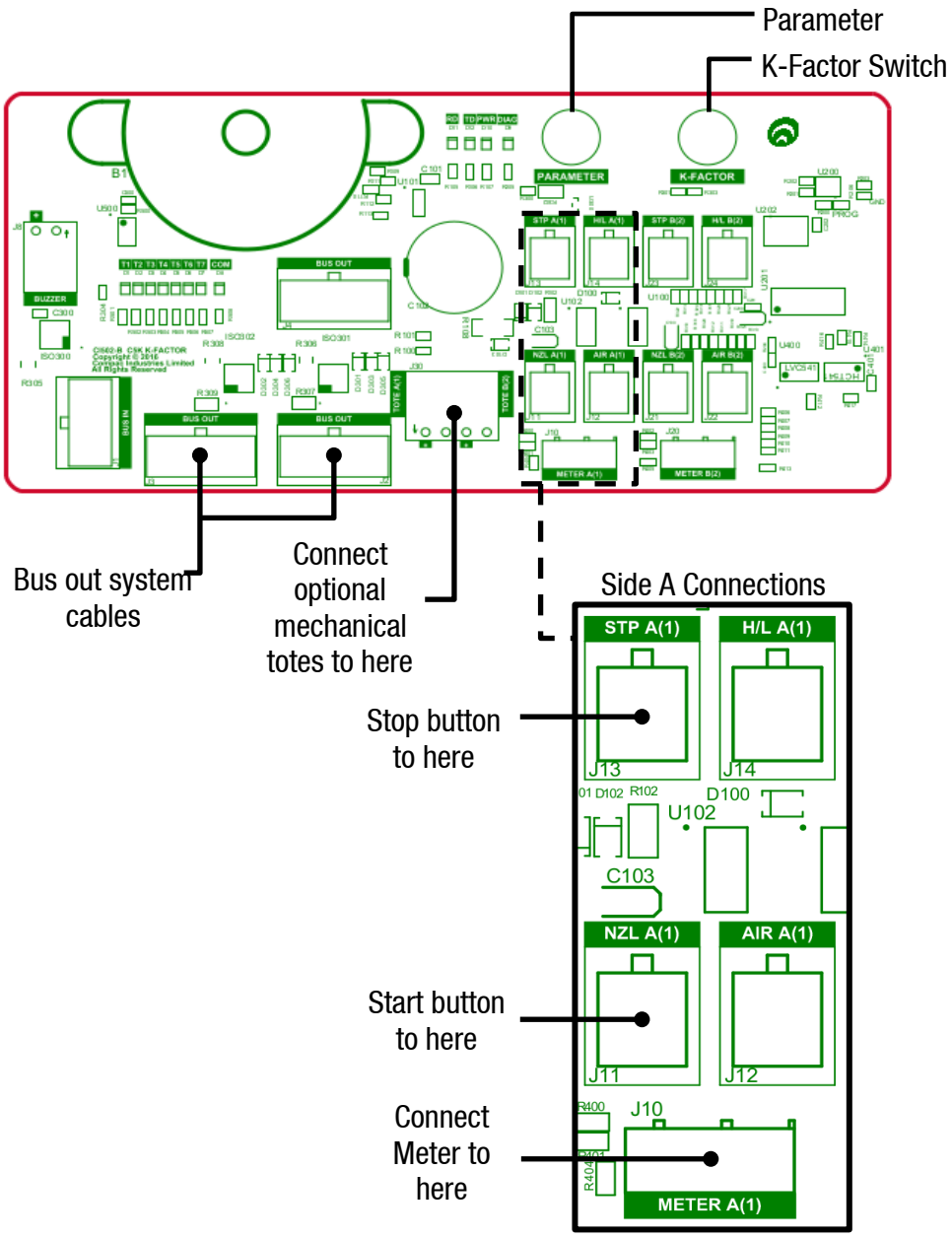
C5000 K-Factor Board

The Compac C5000 K-Factor board is the Main Calculator in the Compac Dispenser. It communicates to the KG100 meter to get the current mass and returns it to the C5000 Processor board. It also reads the Start and stop buttons for both sides (side A and side B).

The Compac C5000 K-Factor board also is a user interface enabling the setup operation of the dispenser .

These set-up interfaces (located on the drawing) are:

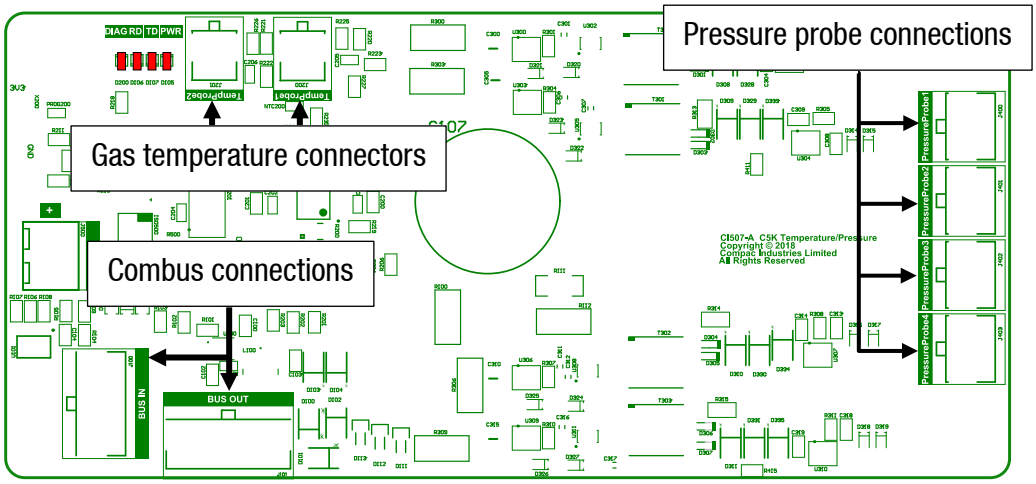
- The **Parameter** switch.
- The **K-Factor** switch.



Temperature Pressure Board

The Temperature pressure board is responsible for the following tasks:

- Communication to the slave display
- Reading the Gas temperature probe
- Reading the ambient temperature
- Reading the Pressure transducer
- Communication to the C5000 Processor board



Dispenser Spare Part

The following lists contain the most commonly used spare parts and kits for Servicing Compac Dispensers. They are not an exhaustive list of all possible parts for current or historical Dispensers. If a part you want to order is not listed, please contact the Compac spare parts department for a complete listing.

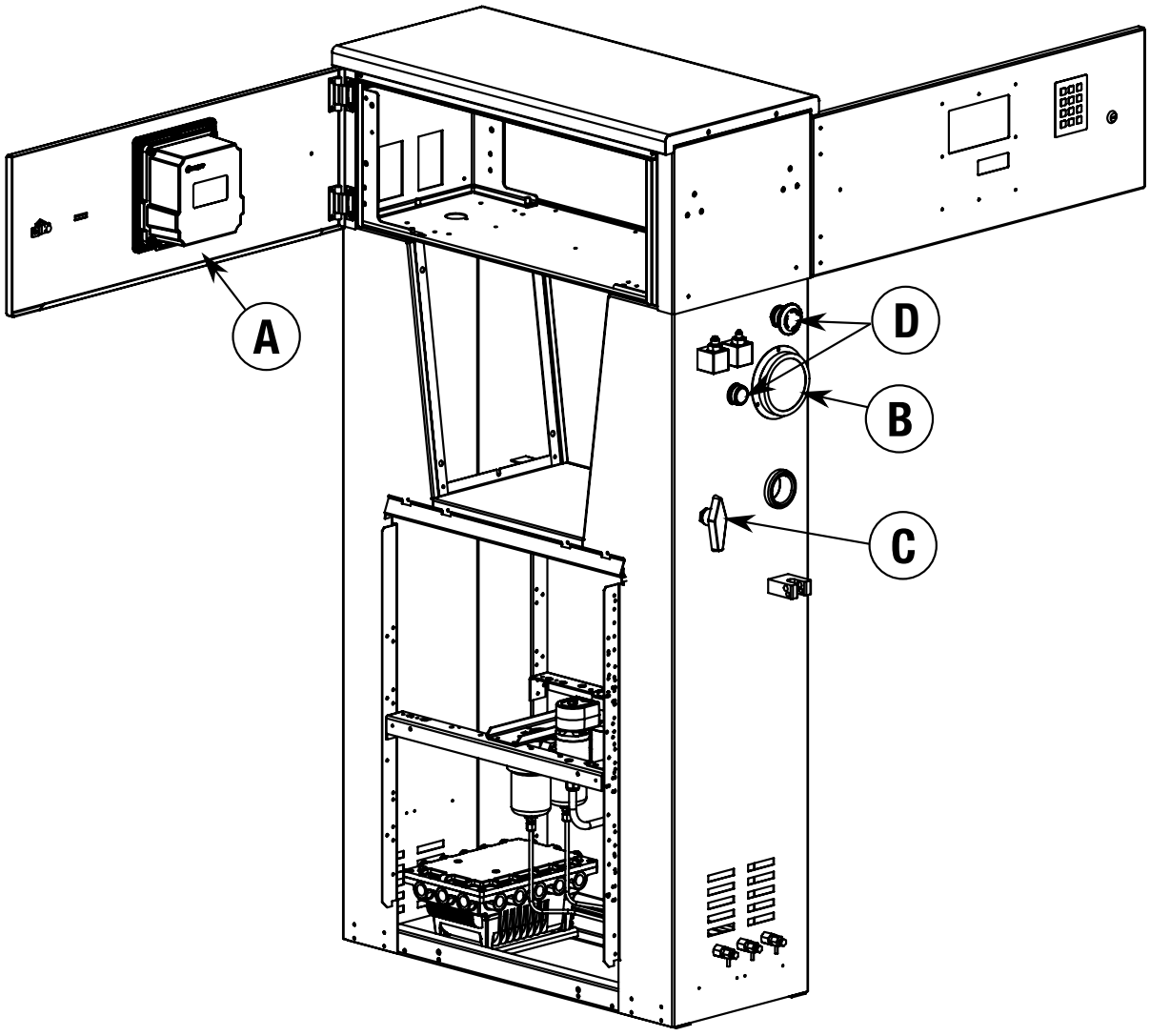
Main Dispenser Spare Parts

See diagram on the next page for part locations.

Item	Part Number	Description
A	**F-CP-C5K-DSPY7D1**	C5000 7D1 DISPLAY
	F-BA-TOTE-A-K	Electromechanical Tote With 200mm Cable
	F-CP-PRESET-3KMB	3 Key Membrane Keypad - Horizontal
	F-CP-PRESET-3KMV	3 Key Membrane Keypad - Vertical
	F-CP-C5K-PSET	C5000 Preset interface board
	F-CP-C5K-LPG-TP	C5000 Temperature/Pressure board CI507
	F-CP-C5K-KFACT	C5000 K-Factor board CI502
B	**FC-GAUGE-0001**	Dual Scale Pressure Gauge, Units Of Measure In "bar + psi" 100mm. Used on units up to serial number 07F-XXXXXX July 07
	FC-GAUGE-0003	Dual Scale Pressure Gauge, Units Of Measure In "bar + psi" 100mm. Used on units from serial number 07g-XXXXXX July 07 onwards
	FC-GAUGE-0005	Dual Scale Pressure Gauge, Units Of Measure In "kg/cm2 + psi" 100mm
	FC-GAUGE-0006	Dual Scale Pressure Gauge, Units Of Measure In "Mpa + psi" 100mm
C	**FC-VALVE-0001**	Isolating Valve (Complete). Parker 2 Way 8 Series Stainless Steel
	FC-SK-0010	Isolating Valve Seal Kit, Parker 2 Way 8 Series
	FC-B8-HLDBLK	Isolating Valve Handle (Black), Parker 2 Way 8 Series
	FC-B8-HDLRED	Isolating Valve Handle (Red), Parker 2 Way 8 Series
	FC-B8-HLDGSCR-SS	Isolating Valve Handle Grub Screw, Parker 2 Way 8 Series

Item	Part Number	Description
D	FC-PBSW-ESTOP	Red Stop Button With Mushroom Head
	FC-PBSW-START	Green Start Button
E	F-D-MTR350-C5	KG100 Mass Flow Meter
	Compac Hydraulic Module	See Hydraulic Module Spare Parts

Main Dispenser Parts Location



Other Dispenser Parts Not Shown in Drawing

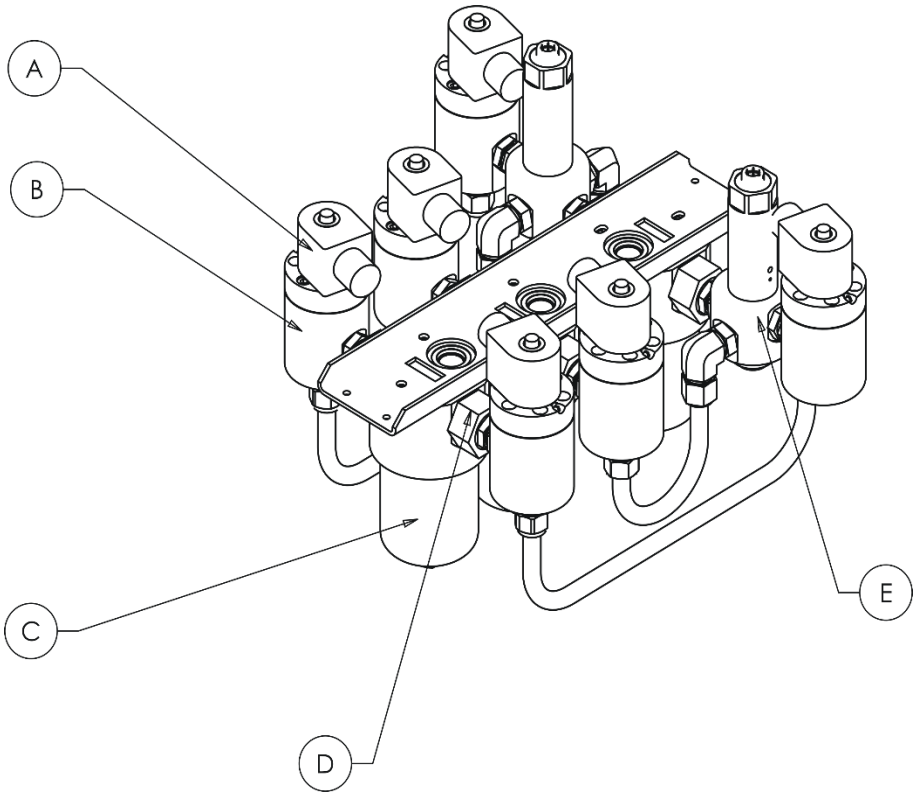
Part Number	Description
F-CU-LPGPRMS5200	C5000 MS5200 LPG PRESSURE SENSOR
F-CU-LPG-TEMPSEN	LPG Temperature Sensor
F-CP-C5K-TERM	C5000 Termainal board CI504
F-CP-C5K-GPIO	C5000 GPIO board CI518
F-CP-C5K-PROCES	C5000 Proessor board CI500
F-CP-C5K-PS	C5000 Power supply CI505
F-CP-C5K-COMMS	C5000 Coms interface board
FC-VALVE-0002A	OASIS BV704 Air Actuated Ball Valve incl. actuator
FC-SK-0029	Service kit for OASIS Air Actuated Ball Valve
P-SOLND-3W-115	Parker Pneumatic Air Solenoid Valve (without coil)
FC-COIL-0001	Coil for Parker Pneumatic Air Solenoid Valve
D-VALVE-BV-1/2PM	Parker Outlet Isolation Valve (for Dispensers with ¾” tubing)
FC-SK-0010	Service kit for Parker Outlet Isolation Valves

Nozzles and Breakaways

Part Number	Description
FC-VALVE-0032	Three way valve with stainless steel body with return pipe (replaces FC-VALVE-0005)
FC-VALVE-0033	Three way valve with stainless steel body without return pipe (replaces FC-VALVE-0009)
FC-SK-0048	Seal kit for three way valve with stainless steel body
FC-SVK-0002	Three way valve ball spindle (order with FC-SK-00048 if required)
FC-PROBE-NZ	NZ 7/16" LPG Refuelling Probe With O-rings
FC-NOZL-CT1000S	NGV1 Type 1 LPG Nozzle With Integral 3-Way Valve, OPW / Sherex CT1000

Part Number	Description
FC-NOZL-CC600	NGV1 Type 2 LPG Nozzle, OPW CC600P30NFS 3000PSI
FC-NOZL-NGV1	NGV1 Type 2 LPG Nozzle, Parker FM301-6FOPC
FC-NOZL-CT5000S	NGV2 LPG Refuelling Nozzle OPW CT5000S (Includes 3/8" Tube To 1/8" NPTF Stainless Steel Fitting For Vent Tube)
FC-BWY-0001	QBCI-09 Compac Inline Quick Breakaway 9/16" SAE Ports (Not For Vent Line Use)
FC-BWY-0003	QBCI-09 Compac Inline Quick Breakaway
FC-SK-0011	QBCI-09 and QBCI-06 Compac Inline Quick Breakaway Seal Kit
FC-OPW-BWY-ILB1	OPW ILB-1 Breakaway
FC-SK-0012	OPW ILB-1 Breakaway Seal Kit
FC-OPW-BWY-ILB5	OPW ILB-5 High Flow Breakaway
FC-SK-0013	OPW ILB-5 High Flow Breakaway Seal Kit

Hydraulic Module Parts



Item	Part Number	Description
A	FC-COIL-0001	SCI-12-SS solenoid coil (Parker) With 3 metre lead
	FC-COIL-0005	S2 -350 solenoid coil (Compac) with 3 metre lead
B	FC-VALVE-0035	S2-350 Complete 350 bar standard solenoid (Without Coil)
	FC-VALVE-0036	S2-350 Complete 350 bar solenoid with O ring piston (Without Coil)
	FC-VALVE-0037	S2-350 Complete 350 bar low temperature solenoid (Without Coil)
	FC-SK-0001	Solenoid Seal Kit for all valves
	FC-VALVE-PSTN-0001	Solenoid Piston - standard
	FC-VALVE-PSTN-S2	Solenoid Piston (O ring style for high oil content gasses)
	FC-SVK-0001	SCI-12-SS Solenoid Top Service Kit (275 bar models only)
	FC-SVK-0003	S2-350 Solenoid Top Service Kit (350 bar standard)
	FC-SVK-0004	S2-350 Solenoid Top Service Kit (350 bar low temperature)
	FC-VALVE-0018	SCI-12-SS Complete 275 bar solenoid (Without Coil)
C	FC-FIL-0001	FCVCI-12-SS Grade 10 Coalescing Filter Element And Filter Bowl O-ring
	FC-VALVE-0012	FCVCI-12-SS Complete Filter/Check Valve With Grade 10 Coalescing Filters
D	FC-SK-0005	FCVCI-12-SS Check Valve Seal Kit
E	FC-SK-0002	RCI-12-SS Regulator Valve Seal Kit
	FC-VALVE-0015	RCI-12-SS Complete Regulator Valve

NOTE: *There are two different solenoid valves available, rated for either 275 or 350 bar pressure. Always quote the serial number of your dispenser when ordering parts, check the part you receive matches the model number on the valve label and never replace valves with a different type.*

Troubleshooting

This **troubleshooting** section outlines issues that you may encounter when using the dispenser, and provides recommended actions.

For sites where the temperature falls below –10°C, power should only be removed from the dispenser for servicing.

Problem	Likely Cause(s)	Recommended Action
For all problems not listed here please contact your service agent		
The C5000 electronics are not working. The indicator LEDs are off and nothing happens when you lift the nozzle (i.e., no beeps or 888888s are displayed).	Unacceptable voltage spikes are causing the fuses on the C5000 to blow.	Fit a voltage-stabilising UPS to the dispenser. Contact your service agent.
	There is low input voltage.	Turn the dispenser off and then on again. Check power supply to dispenser.
A display LCD segment is always on or always off.	Display is faulty.	Contact your service agent
When the Start button is pressed the dispenser does not display the 88888s and reset for the next fill.	The dispenser number has not been set.	Set the dispenser number.
	The Start button or **nozzle** switch is faulty, stuck, or broken.	Check that the **nozzle** switch is operating correctly and is not broken. Check the nozzle switch mechanism is free to move in and out. Contact your service agent.
	The connection between the forecourt controller and dispenser communications connection is faulty.	Check the forecourt controller. Contact your service agent.
The dispenser is under filling the vehicle	The pressure in the storage cascades is lower than target filling pressure.	This is not a dispenser fault. If cascade pressure is above target filling pressure, please contact your service agent.

Problem	Likely Cause(s)	Recommended Action
The preset display is flashing after a fill.	The preset amount has been exceeded. ***NOTE:*** The preset display will stop flashing when the next fill is started	If problem continues contact your service agent.
Gas flows but does not read up on the display.	The C5000 needs to be reset.	Re-power dispenser. If problem continues contact your service agent
The dispenser stops at 999999, 99999.9, or 999999 units according to where the decimal point is set.	The dispenser will stop dispensing if either the money or the quantity displays ever reach these values.	Hang up the nozzle to reset the display and restart. This is not a dispenser fault.
NOTE: *When fixing a Compac LPG Dispenser fault, please follow the recommendations and safety information in this manual. Failure to do this may cause injury or void the warranty.*		

End of Sale Indicators

The **end of sale indicator** allows you to determine the reason why the last fill ended. This can be very useful for fault finding and diagnostics.

To View the End of Sale indicators:

- Press and release the **Parameter** switch until the required hose number is displayed.
- The number in the unit price display is the end of sale indicator for the hose number shown

See the table below for the meaning of the number displayed.

Number	Meaning	Checks
1	Nozzle switch de-activated (does not apply to push to start dispensers).	
2	Preset or temperature compensated value reached. **Normal end of sale message for temperature compensated and Fast Fill dispensers.**	
3	Fill timed out. **Start** button pressed, or nozzle lifted, without flow.	Check inlet gas pressure. Check solenoid operation. Refer Solenoid Problems Check nozzle and breakaway for blockages.
4	The dispenser was stopped by a remote device such as a Point of Sale (POS) or Compac Communicator.	Check that the point of sale is not sending a stop command and is correctly configured.
5	Maximum display value reached.	Check display resolution (Sr) setting. Refer Display Resolution
7	An error has occurred. The error will be shown on the main display.	Check error code reason. Refer Error Codes
8	Outputs sequenced normally and dispenser finished on the low flow cutoff setting. **Normal end of sale message for regulator controlled dispensers**	
10	Low flow timeout	
12	Parity error on main display. This is caused by a fault in the display or a bad connection in the display wiring loom.	Check displays are dry and all connections tight. Try

Number	Meaning	Checks
		swapping with another display if available.
14	Main display not detected. This is caused by a fault in the display or a bad connection in the display wiring loom.	See above.
20	The pressure at the first measurement was within 20bar of the calculated maximum pressure.	Check for blockage in the fuel delivery hose, breakaway or vehicle pipework.
21	The pressure at the second measurement exceeded the calculated maximum pressure.	Check for blockage in the fuel delivery hose, breakaway or vehicle pipework.
22	The pressure at the third measurement exceeded the calculated maximum pressure.	Check for blockage in the fuel delivery hose, breakaway or vehicle pipework.
25	StoP switch operated.	Check the stop switch wiring and switch operation. Refer LPG Dispenser Electrical Schematic.
26	Twin pressure sensor values (when fitted) do not agree.	Check pressure sensor calibration.
30	Maximum flow rate exceeded.	
31	Over-pressure switch has been activated.	
32	Dispenser on hold. (No fuel will be dispensed).	
35	Density Error	
41	Meter Disconnected	
43	Excess Flow	
163	Low flow timeout	
150	First measurement is within 20 bar of the target	
151	Measurement exceeded the maximum pressure	
152	No flow possible	
153	Prefill check error	

Number	Meaning	Checks
154	Fill target met	
155	Target pressure reached	
156	Target mass reached	

Error Codes

Error codes indicate any problems with the dispenser. These problems are indicated to you by codes displayed on the screen.

After you have physically corrected a fault, you need to clear the fault message displayed on the control panel before normal operation can resume.

NOTE: *You should read and understand all safety precautions before operating or maintaining the Compac LPG Dispenser.*

NOTE: *When fixing Compac LPG Dispenser faults, please follow the recommendations in this manual. Otherwise you may injure yourself and void the warranty.*

Error Code	Likely Cause	Recommended Action
Err 3	Loss of price in the Dispenser.	If the dispenser is connected to a site Controller, the price on the dispenser should be set to 0.00 and the pricing should be sent from the Controller. This procedure is outlined in the Hose Price section. If the dispenser is not connected to a site Controller, the price must be set on the dispenser. This procedure outlined in Hose Price section.
	Loss of hose number in the Dispenser.	Check that the hose number has been set. This procedure is outlined in the Hose Number section.
Err 8	Excessive reverse flow.	Repower dispenser If problem persists contact your service agent.
Err 9	Gas metering error	Re-power the dispenser. If problem persists contact your service agent
Err 10	No Configuration data	Contact your service agent
Err 12	EPROM failure.	Contact your service agent
Err 13	The temperature pressure interface board is disconnected or has failed.	Contact your service agent

Error Code	Likely Cause	Recommended Action
Err 14	The temperature probe has been disconnected, or is connected with wire links still in place.	Contact your service agent
Err 15	The pressure probe has been disconnected.	Contact your service agent
Er41	Pump comms lost	Check the connecting wire connections to the comms bards form the pump side and from the controller side.
Er 50	Meter communication error	Check that the meter is connected correctly. Check correct configuration and correct software installed. Ensure the meter IDs on the dispenser software and meter match
Er 52	Meter error	If the problem persists, repower the unit. Replace the meter if necessary
Er 53	Meter stopped vibrating	If the problem persists, repower the unit. This error might display when the dispenser is powered up. In this case it is normal. Replace the meter if necessary
Er 54	Temperature sensor failure	If the problem persists, repower the unit. Replace the meter if necessary
Er 55	Meter not ready	Wait for meter to calibrate. If the problem persists, repower the unit
Er61	Meter could not set it's zero point	Try restarting the meter. If the problem persists, Replace the meter.
Er62	Meter could not reset the batch (Could not zero the transaction values when nozzle was lifted to start a new transaction)	Try restarting the meter. If the problem persists, Replace the meter.
Er71	V50 meter is set but variant is not selected	Please select DEF or LPG to get rid of this error
	Display offline/ Display fault	Check the connections to all displays, Check the configurations for slave boards (If slave displays are connected) Check and/or replace the display
LPG 157	Leaking Solenoid	There is a Gas flow when the Solenoid is closed

Error Code	Likely Cause	Recommended Action
LPG 158	Volume finding Error	
LPG 159	Temperature probe calibration	
LPG 160	Pressure probe calibration	
LPG 161	Goal calculation error	
LPG 162	Unknow error	
LPG 164	Pressure probe error	
hoLd	Processor offline / no power to processor	This will occur upon start up – allow time for the processor to load. If the problem persists, check connections to processor
cAL Ib c	K-Factor data integrity failure, or the processor board has been replaced	The K-Factor seal must be broken, and the switch must be pressed
cAL Ib P	The K-Factor board has been swapped/replaced	The K-Factor seal must be broken, and the switch must be pressed
cAL Ib	The unit needs calibration, usually due to a hardware change	Check the K-Factor and temperature and density calibrations
cAL IbF	K-Factor is not set or is 00.0000	Set the K-Factor Calibrate meter
A Ir	May suggest air is in the system. May be density out of range, or coil amplitude too low while meter is operating, displayed until next sale is started	Make sure pump is running. Check tank and pipework for leaks. Purge system. Increase the Solenoid delay on the K-Factor switch
orun	Overrun – flow above preset	Increase the preset cutoff
SuMP	Sump error – liquid detected in the sump	Empty the sump. Check the dispenser for leaks
GAS	For LPG, the density being returned from the meter is to low	Calibrate meter density using the K-Factor switch