



# CNG DISPENSER SERVICE MANUAL

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## **CNG Dispenser Service Manual Version 1.2.1**

**Date:** 7<sup>th</sup> February 2020

## Conditions of Use

- Read this manual completely before working on, or making adjustments to, the Compac equipment
- Compac Industries Limited accepts no liability for personal injury or property damage resulting from working on or adjusting the equipment incorrectly or without authorization.
- Along with any warnings, instructions, and procedures in this manual, you should also observe any other common sense procedures that are generally applicable to equipment of this type.
- Failure to comply with any warnings, instructions, procedures, or any other common sense procedures may result in injury, equipment damage, property damage, or poor performance of the Compac equipment
- The major hazard involved with operating the Compac C4000 processor is electrical shock. This hazard can be avoided if you adhere to the procedures in this manual and exercise all due care.
- 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 C4000 processor, or damages resulting from the inability to use the Compac C4000 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.
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- 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 or 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 C4000 processor, please refer to the warranty provided by the supplier.
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# 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	High Flow	Ultra-High Flow
<b>Laser</b>	L-CNG15	L-CNG50	L-CNG80
	L-CNGD15	L-CNGD50	L-CNGD80
		L-CNG50-15	L-CNG80-15
<b>Legend</b>	LGDCNG15	LGDCNG50	LGDCNG80
	LGDCNGD15	LGDCNGD50	LGDCNGD80
	LE3KG25D	LGDCNG50-15	LGDCNG80-15

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Product Identification



## Document Control

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**Document Control**



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# Safety

## DANGER PRECAUTIONS

You must adhere to the following safety precautions at all times when working on the Compac equipment. Failure to observe these safety precautions could result in damage to the dispenser, injury, or death.

Make sure that you read and understand all safety precautions before operating the Compac equipment

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

## System Design

Ensure the system design does not allow the dispenser inlet pressure to exceed its rating. The dispenser does not include any safeties to protect against excessive inlet pressure. If necessary, suitable protective devices should be fitted prior to the dispenser inlet.

## Mechanical Safety

Observe the following electrical precautions:

- Never tighten a fitting under pressure, even if a fitting or joint is leaking. Always depressurise the line first.
- Never disassemble a fitting under pressure. Always depressurise the line first.
- Be very careful when disassembling frozen pipework, as gas pressure may be trapped and suddenly released. Always depressurise the line before using.
- Never reuse any O-ring seals that have been in a high pressure gas atmosphere and then exposed to air. These o-rings swell and cannot be reused. Always make sure you have a new seal kit available to replace the seals before disassembly.
- Make sure that all internal surfaces are cleaned and that sliding surfaces are lightly greased with O-ring lubricant before reassembly. Dust and dirt entering components reduce the life span of the components and can affect operation.
- Ensure the service area is thoroughly cleaned before initiating service on CNG components. Dust and dirt entering the components reduce the life span of the component and affect future operations.

## Electrical Safety

Observe the following electrical precautions:

- Always turn off the power to the CNG Dispenser before removing the box lid. Never touch wiring or components inside the CNG Dispenser with the power on.
- Never power up the CNG dispenser with the flameproof box lid removed.
- Always turn off the power to the dispenser before removing or replacing software or memory IC's.
- Always take basic anti-static precautions when working on the electronics, i.e., wearing a wristband with an earth strap. The Compac CNC dispenser is designed to provide safe and reliable dispensing of CNG fuels. They are available in either single or dual hose configurations and with different flow rates.
- Compac CNG dispensers are controlled by a C4000 board which has many programmable features to suit your individual operation.

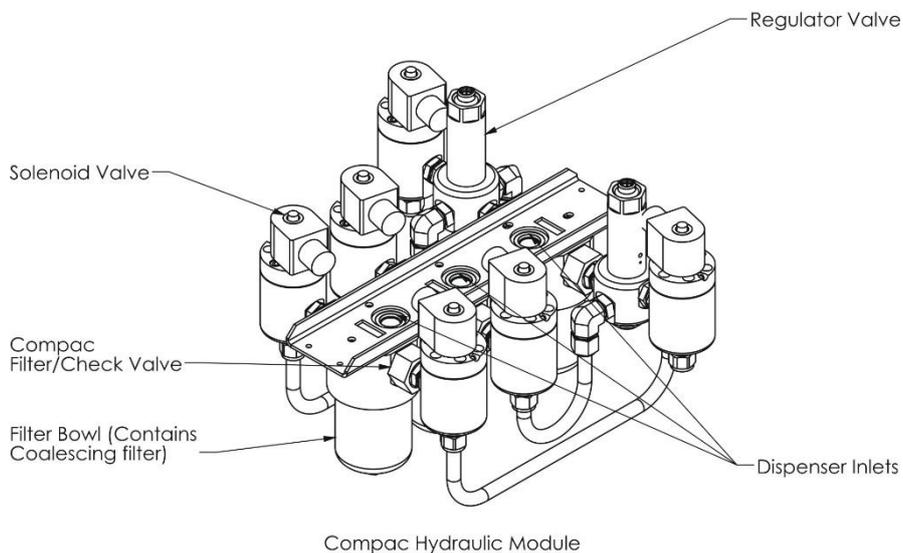
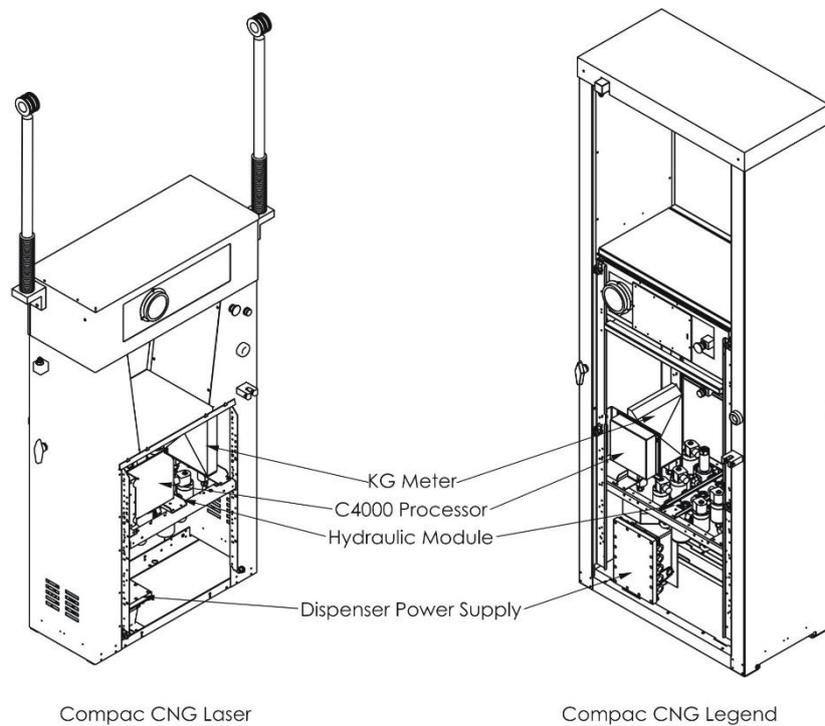
## Introduction

The Compac CNC dispenser is designed to provide safe and reliable dispensing of CNG fuels. They are available in either single or dual hose configurations and with different flow rates.

Compac CNG dispensers are controlled by a C4000 board which has many programmable features to suit your individual operation.

This manual contains the information required to operate and maintain your dispenser. Due to ongoing improvements and customised designs, there may be software features that are not available on your particular unit.

For clarity, this manual will refer to the "Dollars" display. If you do not use dollars please substitute this for your local currency.



# Refuelling Modes

## **Fixed Pressure Refuelling**

The fuel is dispensed through a fixed pressure regulator. When fuel flow reaches a minimum rate. The fuel flow is shut off. Refer to Fixed Pressure Refuelling.

## **Fast Fill Refuelling**

To enable fast refuelling, the pressure in the tank is measured then a small amount of precisely measured fuel is dispensed into the tank and the pressure rise is measured. From these figures, the volume of the tank is calculated, and the tank filled rapidly to this level. When the tank is full the flow is shut off by a solenoid valve. Refer to Fast Fill Refuelling Process.

## **Temperature Compensated Refuelling**

In cold environments, a tank filled to maximum pressure may exceed its maximum pressure if the temperature rises. To prevent overfilling, a thermometer measures ambient temperature and reduces the maximum fill pressure to eliminate this possibility. Refer to Temperature Compensated Refuelling Process.

## Software Versions

### Software Version HIA29.24.9CNG onwards

- Displays error 9 messages in new format: PAUSE flashes in the kg display and the error 9 type is shown in the unit price display.
- Self checking for Error 9 faults while dispenser is idle. Displays message if fault occurs and clears message 10 seconds after fault clears.
- During fill if error 9 fault occurs the fill will stop and the error 9 message displayed for at least 120 seconds. If fault is cleared the display will continue for another 10 seconds.
- If the dispenser is re-powered after an error 9 fault, the message will show for 10 seconds after the start up PAUSE message.
- When using the parameter switch, the hose number (PN) display has been modified to also display a count of the total error 9 faults in the unit shown in the price display. Refer Parameter Switch.
- In the same mode, the display will also flash in the price/kg screen, the last recorded reason for the end of sale and the last recorded error 9.

### Software Version HIA29.25.3CNG onwards

- Removing the decimal place from the totes screen
- Quick view of totes by rapidly pressing the start button three times
- Modification of error 9 codes to improve diagnostics
- Changed sequencing rates
- Sequencing triggered by minimum flow rates
- Error 7 message changed to read **Er FL** in totes screen
- End of sale reason flashed in unit price display at end of sale

### Software Version HIA29.26.0CNG onwards

- Kilograms dispensed display increased to three decimal places for greater accuracy

## Installation

For Installation instructions, please refer to the Installation manual.

## 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 **PAUSE**, then count down for one minute.  
The dispenser is in a **ready state** once the countdown is finished and the display shows **0.00**.
3. With the dispenser in a **ready state**, check that the C4000 Microprocessor Power LED (D1) is turned on

**NOTE:** *If the dispenser is receiving information, Comms RXD LED (D6) will poll. If the dispenser responds to polls for its respective pump number/s, Comms TXD LED (D7) will also poll.*

- Diagnostic LED (D18) slowly flashing. (If the dispenser is connected to an operational Controller, it flashes slowly but erratically. If the dispenser is not connected to a Controller, it flashes slowly and consistently.)
  - Watchdog LED (D5) is turned off
4. Press the **Start** button.  
The display will show **888888** and the solenoids energise, initiating a fill. Check that Diodes D8, D10 and D11 turn on, indicating a signal is being sent to the triacs to open the solenoid valves.

The diagnostic LED (D18) 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.

5. 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 one minute. This is a default time-out setting in the software for situations when there is no gas flow registered.
6. 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 **PAUSE**. When it is ready, **000** is displayed.

- Press the **START** 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 one minute 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 1-minute 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 1-minute 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.

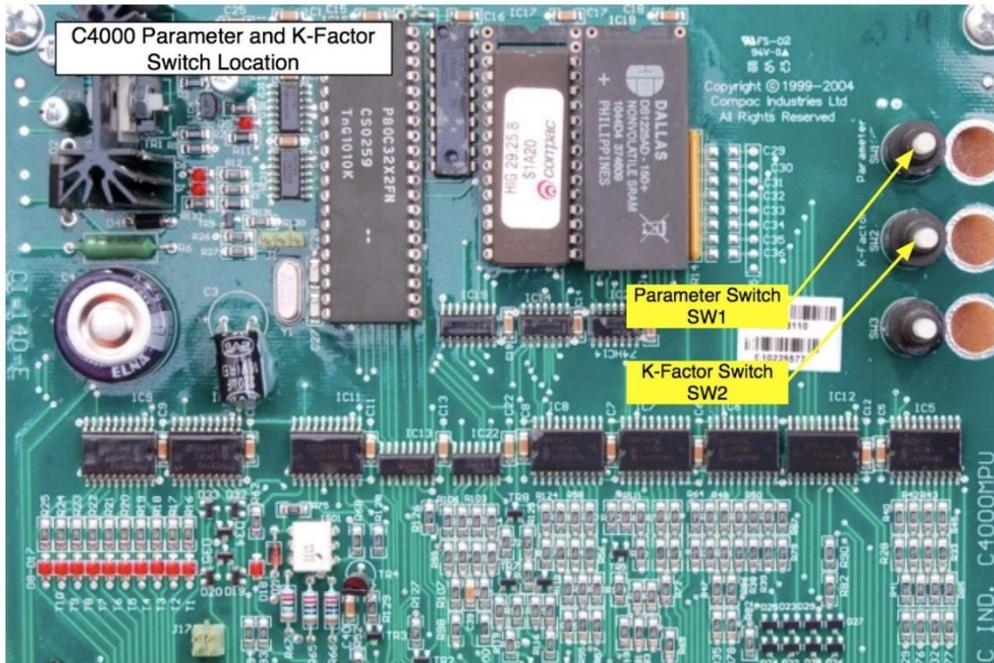
- Complete a few fills on a test cylinder, checking for leaks or unusual operation.

## Dispenser Set-Up

### Parameter Switch

The **Parameter** switch is located on the C4000 processor board and allows you to adjust the unit price, hose number, sequencing rate, and password.

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.

C Configuration	Set-Up Code	Code Description
c***61	P	Software Program version
	P <sub>r</sub>	Unit Price
	SE9	CNG Sequencing rate (FAS,n0r,SLO)
	P <sub>n</sub>	Hose Number
	codE	Dispenser Passcode
c***62	P	Software Program version
	P <sub>rA</sub>	Unit Price Side A
	P <sub>rb</sub>	Unit Price Side B
	P <sub>nA</sub>	Hose Number Side A
	P <sub>nb</sub>	Hose Number Side B
	codE	Dispenser Passcode

### Dispenser Software Version

The dispenser **software version (P)** is the version number of the software currently loaded in the dispensers C4000.

See Dispenser Software Upgrade/Replacement for instructions on Upgrading dispenser software.

To Identify the Software Program Version Number:

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **Parameter** switch once or until **P** is displayed. The system enters a diagnostic mode whereby it displays the software program version and performs a display segment test. It cycles through this program for approximately 10 seconds before reverting to the normal display.

When displaying program version data, the display panel shows **P** in the Dollars screen and **\*\*\*\*\***, in the Kilograms screen where **\*\*\*\*\*** is the abbreviated program version number. For example: Software version HIA29.26.0CNG will read **29260**.

## Unit Price

The **unit price** ( $P_r$ ,  $P_r A$  and  $P_r b$ ) 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.

$P_r$  or  $P_r A$  is the unit price for side A of the dispenser.

$P_r b$  is the unit price for side B of the dispenser.

The unit price can be set at the dispenser or set remotely with the **Compac Dispenser Monitor**.

**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 ( $P_r$ ,  $P_r A$  or  $P_r b$ ).
- 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.

## Sequencing Rate

**NOTE:** Only available on CNG dispensers. Needs appropriate software.

The sequencing rate (SE9) enables you to set the percentage level of maximum flow that sequencing occurs to the next pressure bank.

There are three settings to choose from:

- **FAS:** Switching to the next higher-pressure bank occurs at 40% of the maximum flow rate for a particular bank.
- **nor:** Switching to the next higher-pressure bank occurs at 30% of the maximum flow rate for a particular bank.
- **SLo:** Switching to the next higher-pressure bank occurs at 20% of the maximum flow rate for a particular bank.

**NOTE:** From software version HIA29.25.3CNG onwards the sequencing rates are as follows:

- **FAS:** Switching to the next higher-pressure bank occurs at 60% of the maximum flow rate for a particular bank or when the flow rate drops to 5 kg/min, whichever occurs first.
- **nor:** Switching to the next higher-pressure bank occurs at 40% of the maximum flow rate for a particular bank or when the flow rate drops to 3 kg/min, whichever occurs first.
- **SLo:** Switching to the next higher-pressure bank occurs at 20% of the maximum flow rate for a particular bank or when the flow rate drops to 1 kg/min, whichever occurs first.

**NOTE:** The dispenser leaves the factory with the **FAS** setting.

To set the sequencing rate:

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the Parameter switch (17 or more times) until **SE9** \*\*\* is displayed.
- Enter the sequencing rate. Each press of the Parameter switch passes you over a digit in the 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.
- The displayed sequencing rate is now selected, and operation of the dispenser will be affected immediately. The displays will reset after a ten (10) second timeout.

## Hose Number

The **Hose Number** (PN, PNA and PNB) identifies the dispenser's hose(s) when the dispenser is communicating to a forecourt controller such as the **Compac Dispenser Monitor**.

PN or PNA is the hose number of side A of the dispenser.

PNB is the hose number side B of the dispenser.

When using forecourt controller all dispenser hoses must have unique numbers.

To set the dispenser hose numbers:

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **Parameter** switch until the required hose number is displayed (PN, PNA or PNB).
- Enter the hose number.

**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 parameter menu time out so that the value and quantity amounts are displayed.

### Software Version HIA29.24.9CNG onwards:

From this version of software onwards the hose number (PN) display has been modified to also display the following information:

- A count of the total error 9 faults in the unit shown in the price display.
- The display will also flash in the price/kg screen, the last recorded reason for the end of sale and the last recorded error 9.

This information can be used to as a diagnostic aid to check whether error 9 faults are occurring on a regular basis.

## Dispenser Passcode

The **dispenser passcode** (CODE and PASS) enables you to limit the access to sensitive settings found under the parameter and K-factor switches.

If set, only the dispenser software version can be viewed.

**NOTE:** If the dispenser is connected to the forecourt PC, you can access the dispenser information via the **Compac Dispenser Monitor** program, even if the dispenser is passcode is enabled.

To Set the Dispenser Passcode:

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **Parameter** switch until **Code** is displayed.
- Enter the new passcode.

**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.

The dispenser is now passcode protected. Store the passcode in a secure place.

To Disable the Dispenser Passcode:

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **Parameter** switch until **PASS** is displayed.
- Enter the current password.

**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.

- Press and release the **Parameter** switch until **Code** is displayed.
- Clear the password by setting it to 000000.

**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.

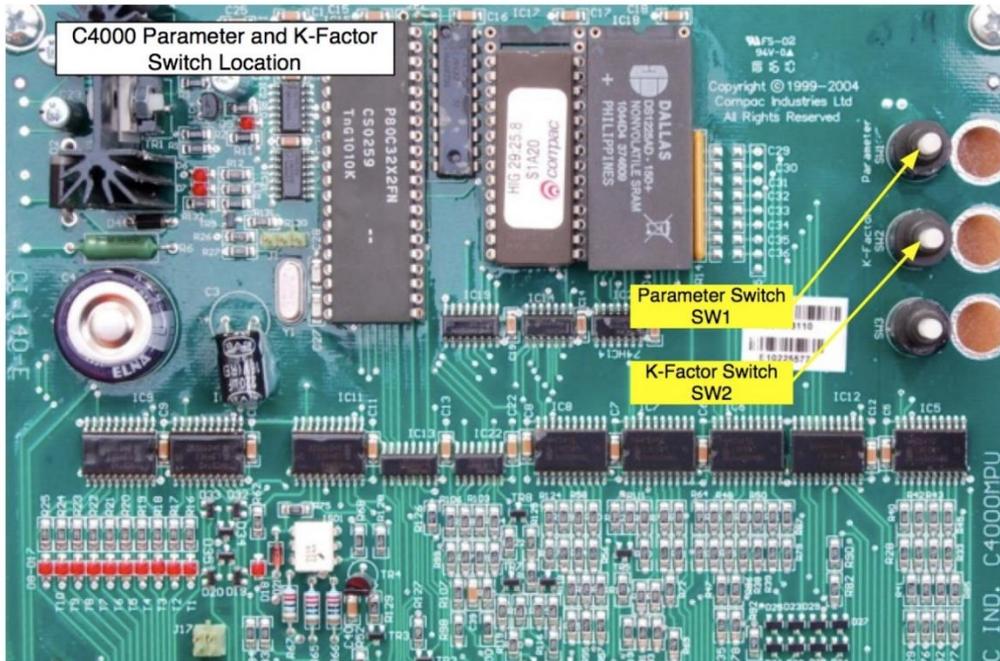
- Let the menu time out so that the value and quantity amounts are displayed.

The dispenser passcode is now disabled.

## K-Factor Switch

The **K-Factor** switch is located on the C4000 indicator board. It is used to access and set up options on the C4000 dispenser. (The order in which they appear here is not the order in which they should be set).

**NOTE:** Some settings are only used in temperature compensated systems, and dual hose dispensers.



## Menu Options

The K-factor switch will offer different menu options depending on the current C Configuration Code.

The \* indicates that you can achieve the displayed menu option, regardless of what the indicated part is set to.

C Configuration	Menu Options Available
c0**6 1	dSf, f, LfA, HfA, Sp, b, C
c0**62	dSf, fA, Fb, LFA, HFA, Lfb, Hfb, SP, b, C
c 1**6 1	dSf, f, fpA, PLA, rA, E, U, gAin, LFA, HfA, gC, Sp, b., C
c 1**62	dSf, fA, fb, LfA, HfA, E, uA, ub, gAinA, gAinb, FpA, pLA, rA, fpb, pLb, rb, Lfb, Hfb, 9C, Sp, b, C
c2**6 1	dsf, f, LfA, HfA, E, u, u2, gAin, gAin2, fpA, pLA, rA, 9C, sp, b, C
c2**62	dSf, fA, fb, LfA, HfA, Lfb, Hfb, E, uA, ub, uA2, ub2, gAinA, gAinb, gAinA2, gAinb2, fpA, PLA, rA, fpb, pLb, rb, gC, Sp, b, C
c3**6 1	dsf, f, LfA, HfA, u, gAin, FpA, 9C, sp, b, C
c3**62	dsf, fA, fb, LfA, HfA, uA, ub, gAinA, gAinb, fpA, fpb, Lfb, Hfb, 9C, sp, b, C
c4**6 1	dsf, f, LfA, HfA, u, u2, gAin, gAin2, fpA, gC, sp, b, C
c4**62	dsf, fA, fb, LfA, HfA, Lfb, Hfb, uA, ub

**Dispenser Set-Up**

## Density Factor

The **density factor (dSF)** is used to set the format of the quantity that is displayed. For KG, a density factor of **1.000** is used. For other units of measure, different density factors are required.

To determine the correct density factor for the unit of measure you would like to use on the read-out, consider the following:

- The dispenser read-out displays the **measured quantity in KG divided by the density factor**
- When the required unit of measure is kg the density factor should be set to 1. In this case the display will show the **measured quantity in kg**
- When another unit of measure is required, the density factor should be set to the ratio between the required unit of measure and kgs. In this case the display will show the **measured quantity (kg) / density factor (unit of measure/kg)**

**For example:** if you wish to show the display in pounds:

$$1 \text{ pound} = 0.4534 \text{ kg}$$

so density factor is entered as 0.4534.

$$\text{If 1kg is dispensed the display will read } \frac{1}{0.4534} = 2.205 \text{ pounds}$$

## Adjusting the Density Factor

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Open the access panel and remove the cover of the C4000 processor box, which is illustrated in the Dispenser Component Locater section.
- Press the **K-Factor** switch once and release.

The display shows **dSF \*\*\*\*\***, which is the current density factor setting for the dispenser that you are commissioning.

- Enter the required Density Factor.

**NOTE:** Each press of the **K-Factor** 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.

## Meter K-Factor

The meter **K-Factor (FA and Fb)** is a meter correction factor used to ensure the displayed quantity is correct.

**F** or **FA** is the meter K-factor on side A of the dispenser.

**Fb** is the meter K-factor on side B of the dispenser.

The K-Factor is set during the calibration phase Meter Calibration and does not require adjusting during service.

### To Adjust the Meter K-Factor

- Make sure that the dispenser is idle, with the nozzle in its holster.

Press and release the **K-Factor** switch until the required meter K-factor is shown (**F** or **FA** or **Fb**)

- Enter the required K-Factor.

**NOTE:** Each press of the **K-Factor** 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.

### Minimum Flow Rate

The **minimum flow rate** (**LF A** and **LF b**) is the low flow cut-off at the end of the fill.

**LF A** is the minimum flow rate of side A of the dispenser.

**LF b** is the minimum flow rate of side B of the dispenser.

These values are adjustable and can be set between 0.5 – 9.9 kg/min.

**CAUTION:** Do not set the minimum flow rate so that it is equal to or above the maximum flow rate.

### To Adjust the Minimum Flow Rate

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **K-Factor** switch until the required minimum flow rate is displayed. (**LF A** or **LF b**)
- Enter the new minimum flow rate.

**NOTE:** Each press of the **K-Factor** 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.

**NOTE:** The Compac factory default setting is 1.0 kg/min.

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

## Maximum Flow Rate

The **maximum flow rate** ( $hFA$  and  $hFb$ ) is the high flow cut-off for when the flow through the dispenser is too high.

$hFA$  is the maximum flow rate of side A of the dispenser.

$hFb$  is the maximum flow rate of side B of the dispenser

These values are adjustable and can be set between 5 – 99  $kg/min$ .

**CAUTION:** Do not set the maximum flow rate so that it is equal to or below the minimum flow rate.

### To Adjust the Maximum Flow Rate

- Make sure that the dispenser is idle, with the nozzle in its holster
- Press and release the **K-Factor** switch until the required maximum flow rate is displayed. ( $hFA$  or  $hFb$ )
- Enter the new maximum flow rate.

**NOTE:** Each press of the **K-Factor** 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.

**NOTE:** The Compac factory default setting is 40  $kg/min$  for Car Dispensers and 60  $kg/min$  for High flow or Bus dispensers.

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

## Ambient Temperature

### (Temperature Compensated Units Only)

The ambient **temperature** ( $E$ ) is the temperature inside the dispenser measured by the temperature probe.

The ambient temperature is set at the factory during the calibration phase and does not usually require adjusting during service.

### To Adjust the Ambient Temperature

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **K-Factor** switch until  $E$  displayed.
- Enter in the new ambient temperature as measured.

**NOTE:** Each press of the **K-Factor** 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.

### Electronic Pressure Reading

#### (Fast Fill & Temperature Compensated Units Only)

The Electronic pressure reading ( $\bar{u}$ ,  $\bar{uA}$ ,  $\bar{uB}$ ,  $\bar{uA2}$  and  $\bar{uB2}$ ) is taken from the pressure transducer in the dispenser's utility manifold.

$\bar{u}$ ,  $\bar{uA}$  and  $\bar{uA2}$  relate to the readings of pressure transducers one and two (where fitted) on side A of the dispenser.

$\bar{uB}$  and  $\bar{uB2}$  relate to the readings of pressure transducers one and two (where fitted) on side B of the dispenser.

The electronic pressure reading can be adjusted during pressure transducer calibration to bring it in line with the actual value.

#### To Adjust the Electronic Pressure Reading

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **K-Factor** switch until the required pressure reading is shown ( $\bar{u}$ ,  $\bar{uA}$ ,  $\bar{uB}$ ,  $\bar{uA2}$  or  $\bar{uB2}$ )
- Enter in the new pressure.

**NOTE:** Each press of the **K-Factor** 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.

### Pressure Transducer Gain

#### (Fast Fill & Temperature Compensated Units Only)

The **pressure transducer gain** ( $\bar{GA}$   $\bar{inA}$ ,  $\bar{GA}$   $\bar{inB}$ ,  $\bar{GA}$   $\bar{inA2}$  and  $\bar{GA}$   $\bar{inB2}$ ) is a correction factor used to ensure the pressure transducer is correctly calibrated. Typical values for the gain are usually close to **0.4000**.

$\bar{GA}$   $\bar{inA}$  and  $\bar{GA}$   $\bar{inA2}$  relate to the gains of pressure transducers one and two (where fitted) on side A of the dispenser.

$\bar{GA}$   $\bar{inB}$  and  $\bar{GA}$   $\bar{inB2}$  relate to the gains of pressure transducers one and two (where fitted) on side B of the dispenser.

The pressure transducer gain is set during the calibration phase and does not require adjusting during service.

## To Adjust the Pressure Transducer Gain

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **K-Factor** switch until the required gain is shown (GA 10A, GA 10B, GA 10A2 or GA 10B2)
- Enter in the new gain.

**NOTE:** Each press of the **K-Factor** 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.

## Target Fill Pressure

### (Fast Fill & Temperature Compensated Units Only)

The **target fill pressure** ( $FPA$  and  $FPB$ ) is the final desired vehicle fill pressure after filling and temperature compensation. The units of measure are in bar.

$FPA$  is the target fill pressure of side A of the dispenser.

$FPB$  is the target fill pressure of side B of the dispenser.

**CAUTION:** Do not set the target fill pressure so that it is above the maximum fill pressure.

### To Adjust the Target Fill Pressure

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **K-Factor** switch until the required target fill pressure is displayed flow rate is displayed. ( $FPA$  or  $FPB$ )
- Enter the new target fill pressure.

**NOTE:** Each press of the **K-Factor** 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.

## Maximum Fill Pressure

### (Temperature Compensated Units Only)

The **maximum fill pressure** ( $PLA$  and  $PLB$ ) is the upper limit for temperature compensated filling. The units of measure are in bar.

$PLA$  is the maximum fill pressure of side A of the dispenser.

$PLb$  is the maximum fill pressure of side B of the dispenser.

This is only used in temperature compensated dispensers.

**CAUTION:** Do not set the maximum fill pressure so that it is below the target fill pressure.

#### To Adjust the Maximum Fill Pressure

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **K-Factor** switch until the required target fill pressure is displayed flow rate is displayed. ( $PLA$  or  $PLb$ )
- Enter the new maximum fill pressure.

**NOTE:** Each press of the **K-Factor** 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.

#### Vehicle Tank Temperature Rise

##### (Temperature Compensated Units Only)

Vehicle Tank Temperature Rise ( $rA$  and  $rB$ ) is used to compensate for temperature rise in the gas during a fill. As the tank fills, the temperature of the gas rises. The lighter the tank, the greater the temperature rise will be.

$rA$  is the vehicle tank temperature rise of side A of the dispenser.

$rB$  is the vehicle tank temperature rise of side B of the dispenser

Typical values for these may be:

*Car filling = 20[heavy steel cylinder].*

*Bus, Truck filling = 30[lighter carbon wrapped aluminium cylinder]*

#### To Adjust the Vehicle Tank Temperature Rise

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **K-Factor** switch until the required vehicle tank temperature rise is displayed. ( $rA$  or  $rB$ )
- Enter the new vehicle tank temperature rise.

**NOTE:** Each press of the **K-Factor** 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.

## Display Resolution

The display **resolution** (**SP**) refers to the location of the decimal point. The value, quantity and price per unit display may have none, one, two or three digits displayed after the decimal point, depending upon the currency.

### To Adjust the Resolution

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **K-Factor** switch until the unit display shows **SP**.
- Enter the new resolution. Do this by pressing the K-Factor switch five times. On the fifth time hold the switch down until the decimal point is in the correct place.

There are four positions that the decimal point can be located, allowing the price/kg to be set to the formats **8.888**, **88.88**, **888.8** or **8888**

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

**NOTE:** If the **K-Factor** switch is not pressed for 10 seconds the menu item will time out.

**NOTE:** If either the value or the quantity displays ever reach **999.99** or **9999.9** or **99999** units, the dispenser will stop dispensing.

## b-Configuration Code

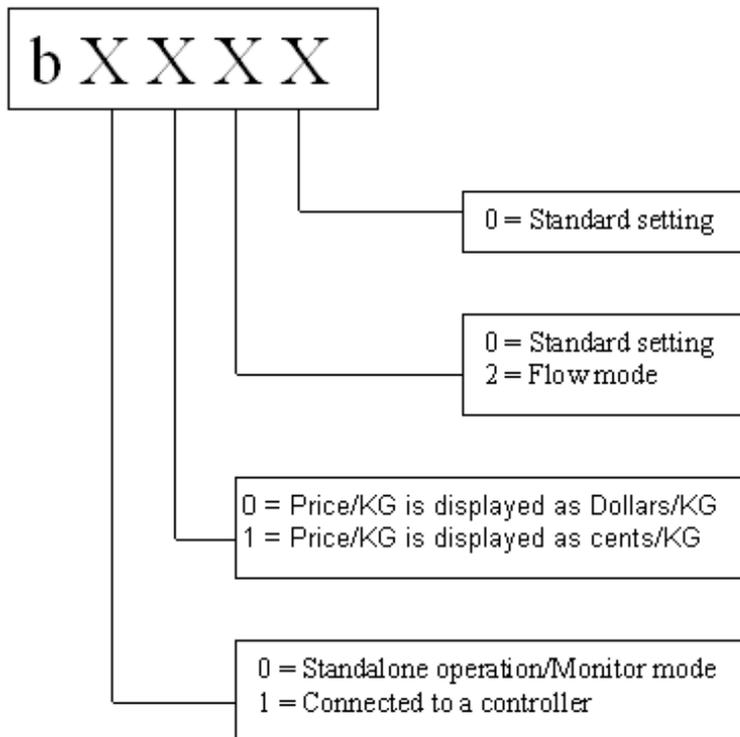
The **b configuration code** (**b**) is a secondary configuration code that changes display options and the forecourt communication operation.

### To Adjust b Configuration Code:

- Make sure that the dispenser is idle, with the nozzle in its holster.
- Press and release the **K-Factor** switch until **b** is displayed.
- Enter the new b configuration.

**NOTE:** Each press of the **K-Factor** 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.



**NOTE:** In stand-alone operation/monitor mode [b 0\*\*\*], the dispenser operates even when not connected to a site Controller. If it is connected to a controller, it will only dispense gas when authorised by the controller. If the controller is turned off and the dispenser power is cycled off and on, the dispenser will operate in standalone mode.

In Controller mode [b 1\*\*\*], the dispenser only operates if it is connected to a site Controller. Transactions are displayed.

**NOTE:** Flow mode [b \*\*2\*] is used to view the current flow rate of the gas. When this mode is set FL 0 will appear in the value display and the current flow rate value will appear in the unit price display. This is used for testing only and not during normal dispenser operation.

## C Configuration Code

The **C configuration code (c)** changes the operation of the dispenser. It is the last setting accessed through the **K-Factor** switch, but it must be set first so that other settings can be selected correctly.

The configuration code has been factory set and should not be changed. If the memory gets wiped and you need to re-enter it, the configuration is written on the yellow label on the C4000 processor board cover.

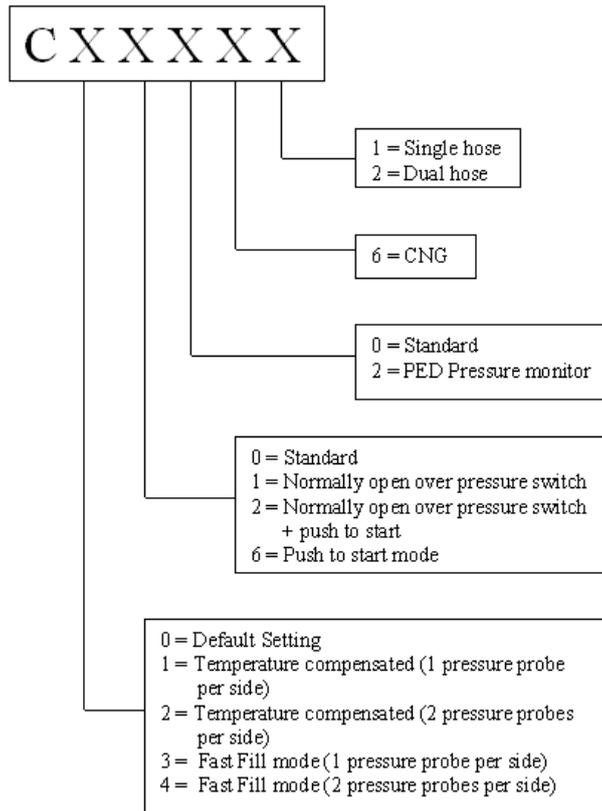
### To Adjust the C Configuration Code

- Make sure that the dispenser is idle, with the nozzle in its holster
- Press and release the **K-Factor** switch until c is displayed.

- Enter the new C configuration see diagram below.

**NOTE:** Each press of the **K-Factor** 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.



**NOTE:** The **PED** pressure monitor mode checks the pressure probe against the pressure limit (PLA), plus 10% during the fill.

**NOTE:** Temperature compensation mode modifies the target pressure, based on the ambient temperature. This can be implemented with one or two pressure probes per hose. Two pressure probes are used for redundancy to check that the pressure of the first probe is within 10bar of the second.

**NOTE:** Fast fill mode measures the pressure, but not the temperature. The dispenser fills to the configurable target fill pressure (**FPA** or **FPb**).

## Dispenser Operation

### Turning the Dispenser on

When the power is applied to the dispenser, the display will show **PAUSE** and count down from 60 seconds. 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**

**NOTE:** Before starting a fill, the software checks the status of the Stop switch. If the switch is latched on, the display will flash **STOP** and will not allow the fill to proceed until the switch is reset. The switch can be reset by rotating the Stop switch in a clockwise direction.

### Refuelling a Vehicle

There can be up to three storage banks for CNG refuelling. During filling the dispenser sequences through these banks from low to high as the pressure in the vehicle cylinder increases and the flow rate drops.

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 display flashes **F in.**
- 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.

## Fast Fill Refuelling Process

The fast fill refuelling process uses pressure sensors to calculate the quantity of gas required to fill a vehicle to a configurable target fill pressure (**FPA**).

The technical operation of a fast fill dispenser is as follows:

- Press the start button or remove the nozzle from the holster to initiate a fill.
  - The display will indicate **888888** then clear, at this point both the gas and value totals will display **0.00**.
- Connect the refuelling nozzle to the vehicle.
- The refuelling valve is opened and when flow is detected the solenoids shut immediately. Pressure reading ( $P_1$ ) and amount dispensed ( $KG_1$ ) is recorded.
- The solenoids are opened and filling continues as follows:
  - If  $P_1$  was less than 50bar ( $P_1 < 50$ ), the fill will continue for 20 seconds.
  - If  $P_1$  was greater than 50bar but less than 100bar ( $50 < P_1 < 100$ ), the fill will continue for 14 seconds.
  - If  $P_1$  was greater than 100bar but less than 150bar ( $100 < P_1 < 150$ ), the fill will continue for 10 seconds.
  - If  $P_1$  was greater than 150bar but less than 180bar ( $150 < P_1 < 180$ ), the fill will continue for 6 seconds.
- The solenoids shut and pressure reading ( $P_2$ ) and amount dispensed ( $KG_2$ ) are recorded.
- The amount of gas  $P_1$  to completely fill the vehicle to **FPA** is calculated as follows:

$$KGf_1 = \frac{(KG_2 - KG_1) * (FPA - P_1)}{(P_2 - P_1)}$$

- The dispenser fills to  $KGf_1$  and stops. This is the end of the fill.

## Temperature Compensated Refuelling Process

The technical operation of a temperature compensated dispenser is as follows:

- Press the start button or remove the nozzle from the holster to initiate a fill. The display will indicate **888888** and then clear, at this point both the gas and value totals will display **0.00**.
- Connect the refuelling nozzle to the vehicle.
- The refuelling valve is opened and when flow is detected the solenoids shut immediately. Pressure reading ( $P_1$ ) and amount dispensed ( $KG_1$ ) are recorded.
- The compensated fill pressure  $P_{tc}$  is calculated. If the vehicle is within 20 bar of this pressure, no filling takes place.
- The solenoids are opened, and filling continues as follows:
  - If  $P_1$  was less than 50bar ( $P_1 < 50$ ), the fill will continue for 20 seconds.
  - If  $P_1$  was greater than 50bar but less than 100bar ( $50 < P_1 < 100$ ), the fill will continue for 14 seconds.
  - If  $P_1$  was greater than 100bar but less than 150bar ( $100 < P_1 < 150$ ), the fill will continue for 10 seconds.
  - If  $P_1$  was greater than 150bar but less than 180bar ( $150 < P_1 < 180$ ), the fill will continue for 6 seconds.
- The solenoids shut and pressure reading ( $P_2$ ) and amount dispensed ( $KG_2$ ) are recorded.
- The amount of gas ( $KGf_1$ ) to completely fill the vehicle to  $P_f$  is calculated as follows:

$$KGf_1 = \frac{(KG_2 - KG_1) * (P_f - P_1)}{(P_2 - P_1)}$$

- The dispenser fills to  $KGf_1$  and stops. This is the end of the fill.

## Reading the Dispenser Totals

To read the dispenser totals:

- Quickly press the **SEArE** 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\*\*\*\*\***).

**NOTE:** From software version HIA29.25.3CNG onwards the decimal place has been removed from the tote. There will be two digits on the top (\$) display and six digits on the lower (kg) display. For dual dispensers, the A or B side will be indicated in the unit price display.

## **Servicing**

### **Degassing the Dispenser**

When replacing or servicing dispenser hydraulics the dispensers must be de-gassed.

#### **Degas the Dispenser**

- Isolate the dispenser by closing the inlet gas supply valves at the base of the unit or at the priority panel.
- Fill one or more CNG bottles until the dispenser pipework is completely depressurized. Ensure that the isolation valve remains open during this process.

Open the bleed valve on the utility manifold (where fitted) to remove any remaining gas inside the dispenser.

## Schedules Servicing

### Weekly Checks

- Check the sealing and operation of the three-way refuelling valve.
- Check the sealing and operation of the solenoids.
- Check the sealing and setting of the regulator.
- Drain the Coalescing Filter.

### Suggested 6-monthly or 400 Compressor Run Hour Service

- Check the dispenser for leaks.
- Check the Coalescing filter elements, replace if necessary.
- Check damage and electrical continuity of Refuelling Hoses.
- Replace Breakaway seals.
- Replace 3-way refuelling valve seals and inspect ball for scratches and wear. Replace ball if necessary.
- Replace refuelling probe O-rings. Check that the probe is not damaged or bent, replace if necessary.
- OEM Nozzles and Breakaways - Refer to manufacturer's instructions.

### Suggested Yearly or 8000 Compressor Run Hour Service

In addition to all the checks listed in the 6-month service, carry out the following:

- Dismantle and clean the solenoid valves. Replace the seals and O-rings.
- Dismantle and clean the regulator valves. Replace the seals and O-rings.
- Check the dispenser calibration. Meter Calibration.
- Check the C4000 Processor Board is clean, dry and dust free.
- Check the UPS and voltage stabiliser supplying power to the dispenser is working according to the manufacturer's specifications.
- Check the C4000 flameproof box lid is bolted down tight and all glands are tight.
- Check the zero point and calibration of the dispenser pressure transducers (fast fill & temperature compensation only).

## Checking Dispenser Operation

To check that the dispenser is operating correctly:

1. Fill two gas bottles.
2. Check that:
  - The bottles fill to the desired pressure.
  - The dispenser fills to the preset value.
  - The displays and gauges are working.

## Checking the Sealing of the Solenoid

- De-gas the hose by opening the 3 way valve.
- When the hose is empty check that the flow has stopped. If the flow does not stop, the seals in the final stage solenoid will need to be replaced.

## Checking the Setting and Sealing of the Regulator

Before you start, make sure you have:

An 8mm hex key

**NOTE:** When you are undertaking this check, the dispenser must be turned on and pressurised.

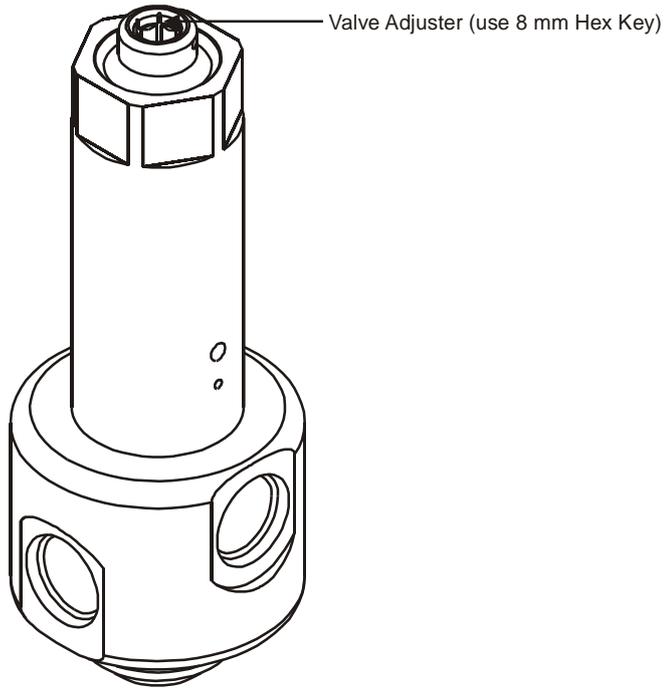
To check the setting and sealing of the regulator:

- Hang up the nozzle and check that the three-way valve is closed.
- Press the start button to initiate a fill and open the solenoids.
- Check that the pressure gauge is at the setpoint reading (typically 200 bar).
- Check that the pressure gauge reads at a steady state, rather than creeping after a fill.

If the pressure gauge is not reading the correct setpoint:

- Insert an 8mm hex key into the top of the regulator body.
- Adjust the pressure up clockwise or down anticlockwise to 200 bar.

If the pressure on the gauge does not remain stable, the regulator valve seal is leaking and will have to be replaced.



## Checking the Over-Pressure Switch Operation

### (Fast Fill & Temperature Compensated Units Only)

To check the operation of the **Over-Pressure** cut off:

- Access the **K-Factor** switch on the C4000 processor.
- Obtain the over-pressure settings, **PLA** (for side A) and **PLb** (for side B), as per the K-Factor Switch Settings section.
- Set the over-pressure cut-off point to below the regulator pressure or target fill pressure (**FPA, FPb**).
- For example, if the regulator pressure is 220 bar, then set the over-pressure to 100 bar. An exact value is not required; just make sure that the value is significantly lower than the regulator pressure.
- Start a fill. The dispenser should stop shortly after the fill begins.
- Check the dispenser **End of Sale** indicator states that the fill has ended because of over-pressure. End of Sale Indicators.
- Reset the over-pressure cut-off point to its original value.

## Checking the Dispenser for Leaks

Before you start, make sure you have:

- Soapy water

To check the dispenser for leaks:

**CAUTION:** Be careful not to spray or drip water into any of the dispenser electronics when checking for leaks.

- Apply soapy water to all joins in the assemblies and fittings on the inside and outside of the dispenser, including the hose.

If bubbles form, there is a leak with that assembly or fitting. The fitting may require tightening, or the seals might need to be replaced.

**DANGER:** You must isolate the gas supply and depressurise the dispenser before disassembling any component or adjusting any fitting. Serious injury may result if components are removed while the dispenser is under pressure.

- Threaded SAE Fittings.
- Adjustable Threaded SAE Fittings.
- Compression Fittings.
  
- To remedy a leak, refer to the appropriate section, depending on the leak is location.
- After checking for leaks, wipe any excess water off the dispenser to prevent corrosion.

## Checking the Refuelling Hose for Leaks

Before you start, make sure you have:

- Soapy water

To check the refuelling hose:

- Visually check the refuelling hose for damage, such as fraying and cuts.
- Apply soapy water to all valves and connections.

If bubbles form, there is a leak in that assembly or fitting. The fitting may require tightening or the seals might need to be replaced.

**DANGER:** You must isolate the gas supply and depressurise the dispenser before disassembling any component or adjusting any fitting. Serious injury may result if components are removed while the dispenser is under pressure.

Replace the hose if it is damaged or leaking.

## Checking the Isolation Ball Valve Operation

Before you start, make sure you have:

- Soapy water

To check the operation of the isolation ball valve:

- Close the isolation valve.
- Open the dispenser access door.
- Open the bleed valve on the utility manifold block (where fitted) and bleed the gas from the refuelling hose.
- Close the bleed valve once the hose is degassed.
- Start a fill.

If the pressure gauge starts to move, the isolation ball valve is leaking or passing gas.

- Apply soapy water to the valve.

If bubbles form, there is a leak in the assembly or fitting. The fitting may require tightening, or the seals might need to be replaced.

For servicing refer to Isolation Valve Seal Replacement.

## Checking the Three-Way Refuelling Valve Operation

Before you start, make sure you have:

- Soapy water

Check the Sealing of the Three-Way Refuelling Valve

To check the sealing of the three-way refuelling valve, apply soapy water to the valve.

If bubbles form, there is a leak, in which case you should replace the three-way refuelling valve seals.

To check the operation of the three-way refuelling valve:

To check the operation of the three-way refuelling valve, do a test fill to check that the valve is filling the vehicle, and venting properly when you disconnect it from the vehicle.

If bubbles form, there is a leak, in which case you should replace the three-way refuelling valve seals.

## Draining the Coalescing Filter

**Before you start, make sure you have:**

- A 3/16" hex key

To drain the coalescing filter:

- De-gas the dispenser.
- Open the dispenser access doors.
- Unscrew the drain plug from the bottom of the filter cover.
- Allow all oil and water to drain from the filter\*.
- If excessive amounts of oil and water are present, remove and replace the coalescing filters.
- Screw in the drain plug and repeat steps 1 to 4 for all additional filters.

**\*NOTE:** Make sure you dispose of any fluids responsibly.

## Filter Element Replacement

The coalescing filters are designed to trap dirt, moisture, oil, and other debris that may damage the valve seals.

Before you start, make sure you have:

- A seal kit - Part number FC-FIL-0001
  - 1 x filter
  - 1 x filter bowl O-ring seal
- O-ring lubricant

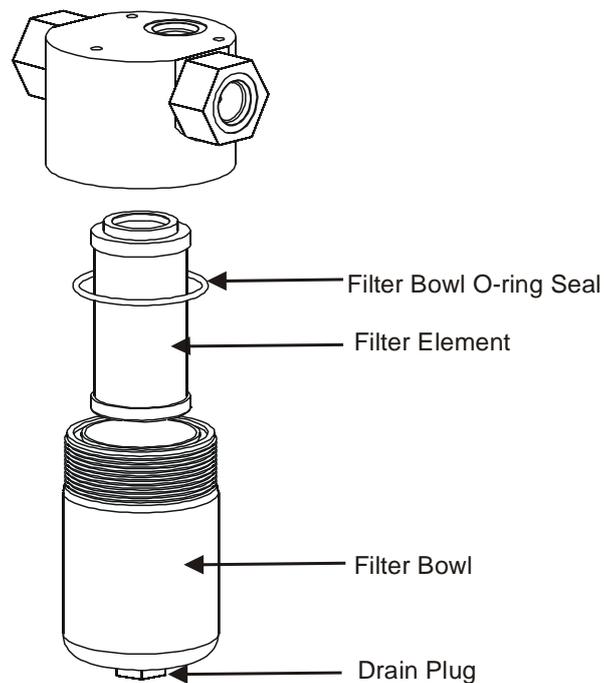
To remove the coalescing filter:

- Degas the dispenser.
- Drain the coalescing filters if they have not been drained already.
- Unscrew the filter bowl(s) with a spanner on the 22mm hex nut at the base of the filter bowl.
- Remove the filter element.
- Clean all oil and dirt off the components with a clean cloth.

To install the new coalescing filter:

- Insert the new filter element and lubricated filter bowl O-ring seal.

**CAUTION:** O-rings that are subjected to natural gas at high pressure swell when exposed to air. Once swollen, they cannot be reused and must be replaced.



**NOTE:** Always use O-ring lubricant to prevent damage to the O-rings.

- Screw in the filter bowl(s)
- Check the dispenser for leaks.

## Solenoid Valve Seal Replacement

These instructions refer to the current Compac S2-350 solenoid valve. The solenoids are available in several types: Standard, high oil and low temperature. Always quote the dispenser serial number when ordering parts and check the model number on the valve body before installation.

**NOTE:** For applications where the gas has a high oil content, a special piston with an O ring seal is available. If you are having problems, discuss this option with your service agent. If the special piston is used for low oil content gas, no harm will occur, but the service life of the seal may be shortened.

Before you start, make sure you have:

- A seal kit - Part number FC-SK-0001
  - 1 x Teflon valve seal
  - 1 x solenoid top O-ring seal
  - 1 x gas return line O-ring seal
- O-ring lubricant
- Solenoid piston – Part number FC-VLV-PSTN-0001 (optional standard)
- Solenoid piston – Part number FC-VLV-PSTN-S2 (optional high oil)
- Solenoid top service kit standard. Part number FC-SVK-0003 (replace valve top if leak detected through stem)
- Solenoid top service kit - low temperature option (-40 degrees C). Part number FC-SVK-0004 (replace valve top if leak detected through stem).

**CAUTION:** Never remove or service the stem. If it is leaking, it must be replaced using the appropriate top service kit.

**CAUTION:** Cleanliness is essential. When working on the open solenoid assembly, cover the opening with a cloth to prevent dust and dirt from entering.

**CAUTION:** O-rings that are subjected to natural gas at high pressure swell when exposed to air. Once swollen, they cannot be reused and **must** be replaced.

**CAUTION:** The Nitrile O-rings have a life span of over 10 years from cure date but improper handling of these O-rings before use can shorten their useful life. O-rings will deteriorate if exposed to ozone or ultraviolet light so keep in original packaging and away from UV light. If in unsure about their condition, do not use old O-rings and order new ones.

**NOTE:** It is not necessary to remove the solenoid body from the dispenser to service the solenoid seals.

To remove the old solenoid valve seals:

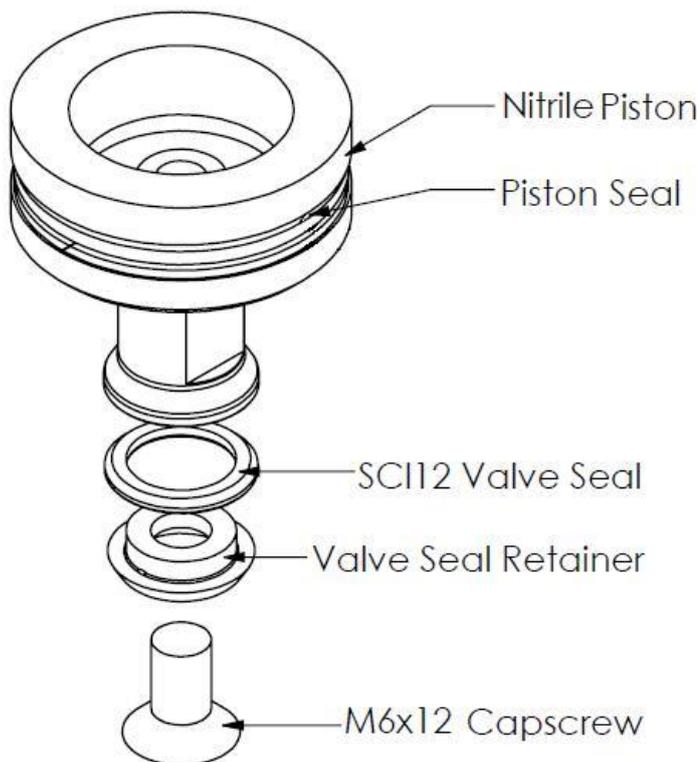
- De-gas the dispenser.
- Switch off the power supply to the dispenser.

**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.

- Unscrew the solenoid coil retaining nut and move the coil out of the way.
- Remove the six cap screws from the solenoid top.

**NOTE:** Do not remove the angled grub screw from the solenoid top. This is epoxied in place during manufacture and should never be removed.

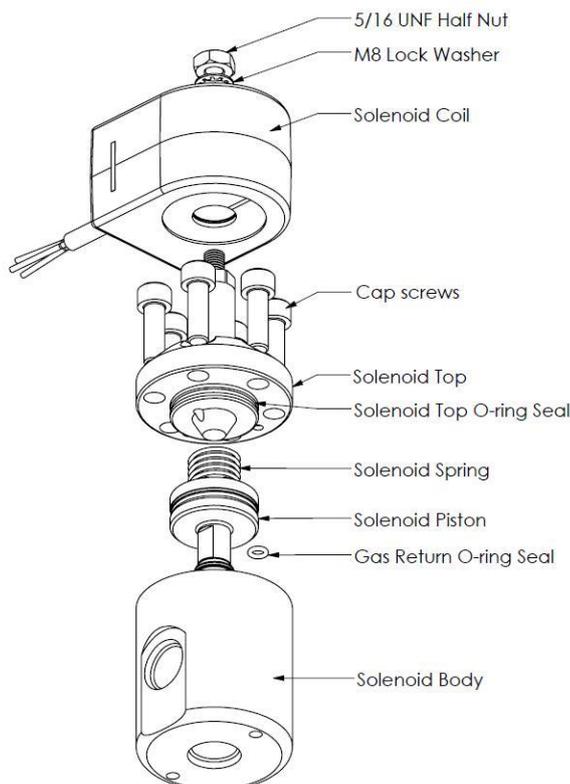
- Remove the solenoid top and remove the old top O-ring seal and gas return O-ring.
- Remove the solenoid spring.
- Screw an M6 cap screw into the solenoid piston to withdraw it from the solenoid body.



- Taking care not to damage the piston, hold the flat part of the piston with a spanner to prevent rotation, then unscrew the M6 x 12 mm cap screw from the bottom of the piston. This releases the solenoid seal retainer and valve seal.
- Discard the old valve seal.
- Clean all oil and dirt off the components with a clean cloth and check that the bleed hole is not blocked.
- While the solenoid is apart, inspect the solenoid piston centre seal and piston for wear, scratching or damage. Replace piston if required.

To install new solenoid valve seals:

- Place the new valve seal and seal retainer on the cap screw.
- Taking care not to damage the piston, hold the flat part of the piston to prevent rotation, and then screw the M6 cap screw into the bottom of the piston.
- Insert a new gas return O-ring.
- Insert the piston back into the solenoid body.
- Insert the solenoid spring.
- Replace the solenoid top O-ring seal.
- Place the solenoid top back on the solenoid body, making sure that the locating dowel is engaged.
- Screw in and tighten the six cap screws.
- Replace the solenoid coil.



- Re-power and re-gas the dispenser then check for leaks and correct operation of the valve.

## Solenoid Coil Replacement

**Before you start, make sure you have:**

- Replacement solenoid coil **FC-COIL-0005** (Compac S2-350).

**NOTE:** Solenoid coils are not interchangeable between models. Make sure you order the correct one by quoting the dispenser serial number. To replace obsolete coils, the entire solenoid will need replacing.

To remove the solenoid coil:

- De-gas the dispenser.
- Switch off and isolate 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 C4000 power supply board.
- Disconnect the appropriate solenoid coil wiring from the C4000 power supply board.

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

- Loosen the gland on the flameproof box that is clamping the solenoid coil lead and pull the lead out of the gland.

Undo the nut on the top of the solenoid valve that is securing the coil and remove the coil from the top of the valve.

To install the new solenoid coil:

- To install a new solenoid coil, reverse the procedure above.

**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**).

## Complete Solenoid Valve Replacement

These instructions refer to the current Compac S2-350 solenoid valve. This replaces all previous solenoids.

Before you start, make sure you have:

- Solenoid valve standard 350 bar model (FC-VALVE-0035) or
- Solenoid valve 350 bar O ring seal option for high oil content gasses (FC-VALVE-0036) or
- Solenoid valve 350 bar low temperature option (FC-VALVE-0037)

**NOTE:** Solenoid valves are supplied without coils. If you need the coil it must be ordered as well.

**CAUTION:** Cleanliness is essential. When working on the open pipes and solenoids, cover the openings with a clean, lint-free cloth to prevent dust and dirt from entering.

To remove the old solenoid valve:

- 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.

- Undo the nut and remove the solenoid coil.
- Undo the gland nuts connecting the solenoid valve to the pipework and manifold and remove valve.

To replace the solenoid valve:

- Ensuring all surfaces are clean and any sealing plugs are removed from the valve, reconnect the pipework and tighten the gland nuts.
- Replace the solenoid coil.
- Repower and re-gas the unit, check for leaks and test for correct operation.

## Regulator Valve Seal Replacement

Before you start, make sure you have:

- A regulator seal kit - Part Number FC-SK-0002
  - 2 x regulator O-ring seals
  - 2 x Teflon back-up ring
  - 1 x Teflon valve seal
- O-ring lubricant

To remove the old regulator valve seals:

- De-gas the dispenser.
- Open the dispenser access doors.
- Unscrew the spring tube by placing a 1 ¼" spanner on the machine hex nut at the top of the spring tube.

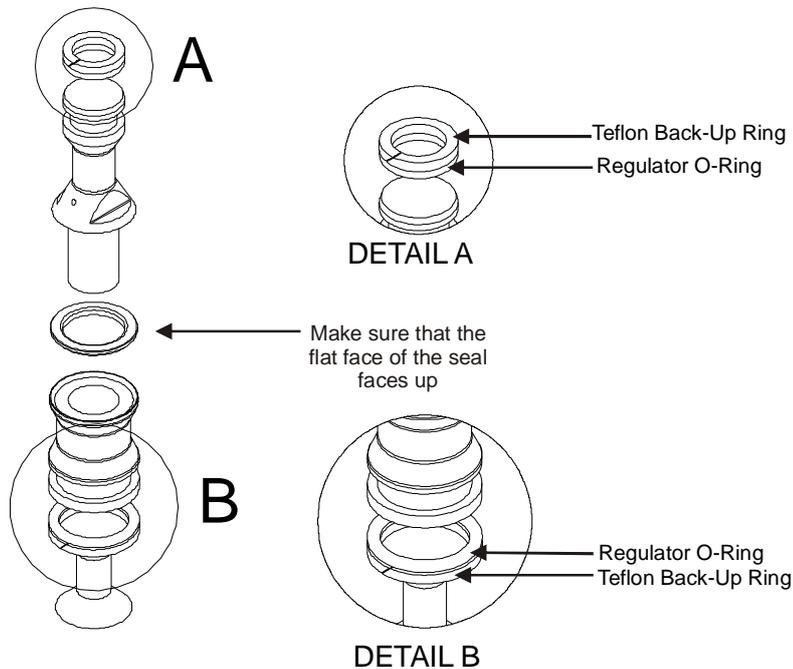
**NOTE:** Do not unscrew the valve adjustment nut. The spring remains at the set tension.

- Unscrew the bottom plug in the regulator body.
- Using a hex key inserted into the base of the piston to stop the piston from twisting sideways and being damaged, push the piston downwards out the bottom of the regulator body.
- Hold the piston by the 8mm flat and remove the M6 cap screw from the bottom.

**NOTE:** The M6 cap screw has a special hole through it. Never substitute it for a normal cap screw.

To install the new regulator valve seals:

- Install the new valve seal. Make sure that the larger flat side of the seal faces upwards.



**NOTE:** O-rings that are subjected to natural gas at high pressure swell when exposed to air. Once swollen, they cannot be reused and must be replaced.

**CAUTION:** The Nitrile O-rings have a life span of over 10 years from cure date but improper handling of these O-rings before use can shorten their useful life. O-rings will deteriorate if exposed to ozone or ultraviolet light so keep in original packaging and away from UV light. If unsure about their condition, do not use old O-rings and order new ones.

- Lever off the two regulator O-rings and two Teflon back-up rings.
- Install two new regulator O-rings and two new Teflon back-up seals.

The back-up rings go on the outside of the O-rings.

**NOTE:** Always use O-ring lubricant on the O-rings to increase the service life.

- Reassemble the piston.
- Push the piston back up into the regulator body with a hex key.

**NOTE:** Keep the piston straight, rotate it clockwise to prevent the new O-ring from catching or ripping.

- Screw in the bottom plug.
- Screw on the spring tube until tight.

Check the setting and sealing of the regulator for correct pressure.

## Isolation Valve Seal Replacement

**NOTE:** Please make sure you identify the valve before disassembling it to make sure you have the correct seal kit available.

Complete valve is part number FC-Valve-0001

Before you start, obtain the following replacement parts and equipment:

- FC-SK-0010 Parker Isolation Valve Seal Kit
- Refer to Spare Parts list for other items that you may need.

To remove the isolation valve seals:

**CAUTION:** Take care when disassembling the valve, as a lot of parts look similar.

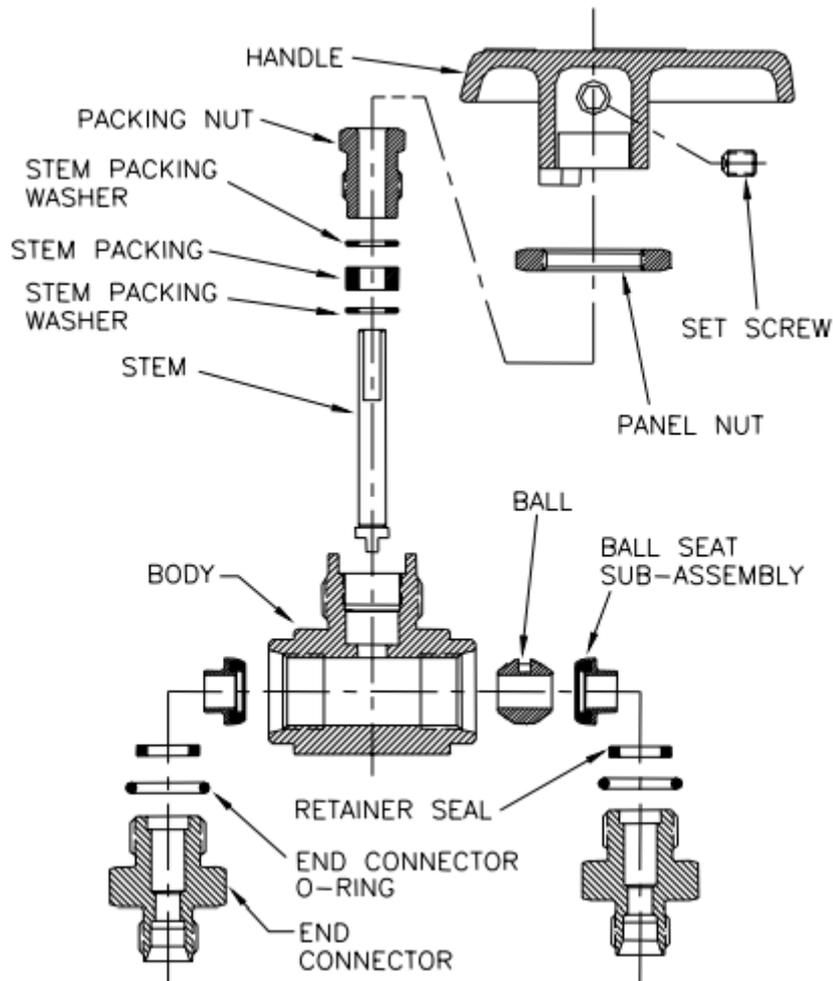
- De-pressurise the valve and remove it from the pipework.
- Remove the handle and panel nut to remove it from the cabinet.
- Disassemble the valve, as per the drawing below.
- Undo the packing nut and remove packing washers, packing and stem.
- Undo the end connectors and remove the seals, seat assembly and ball

Clean all components with a clean dry lint free rag.

**CAUTION:** O-rings that are subjected to Natural Gas at high pressure. Swell when exposed to air. Once swollen they must be replaced.

- Blow compressed air (100 psi) through all ports to remove any impurities that may damage the seals in operation.

**CAUTION:** Wear appropriate safety eye wear when using compressed air.



To replace the isolation valve seals:

**CAUTION:** Take care to keep all parts clean while assembling.

- Apply a light coating of approved grease to the ball then replace the ball and ball seat sub-assemblies, making sure the slot in the ball is at the top.
- Making sure the retainer seal and end connector O ring are in place, screw in the end connectors. Do not tighten yet.
- Locate the stem in the ball slot then replace the stem washers, stem packing and packing nut.
- Open and close the valve a few times to seat the ball valve before tightening the end connectors and packing nut.
- Reattach the valve to the cabinet and reconnect the pipework.
- Reapply gas to the valve and check for leaks.

## Gas Operated Valve (option) Seal Replacement

**CAUTION:** Follow all safety precautions listed at the front of this manual.

Before doing any work on the valve, ensure that the power is off and the system pressure is reduced to atmospheric levels. Ensure that the pressure is removed from both the inlet and outlet ports of the valve and from the air supply line.

Before you start, obtain the following replacement parts and equipment:

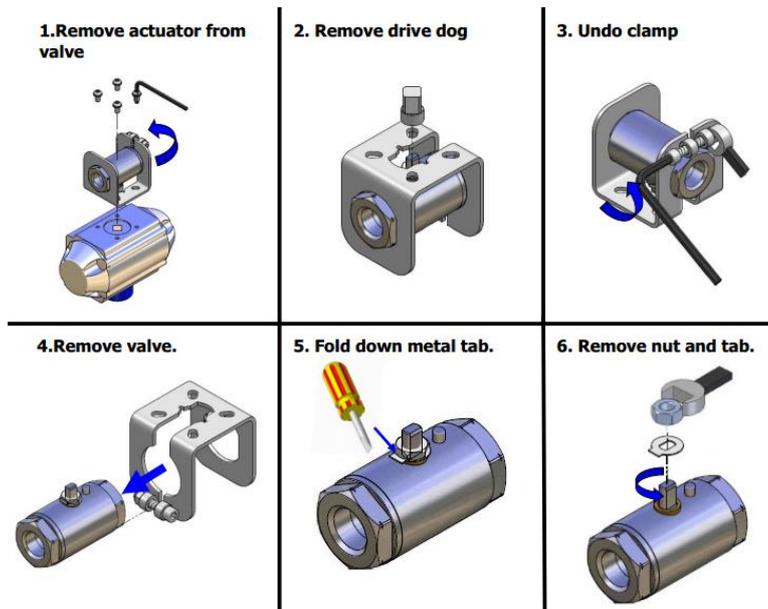
- FC-SK-0029 Oasis Gas Operated Valve Seal Kit

Always quote model and serial number of your dispenser when ordering.

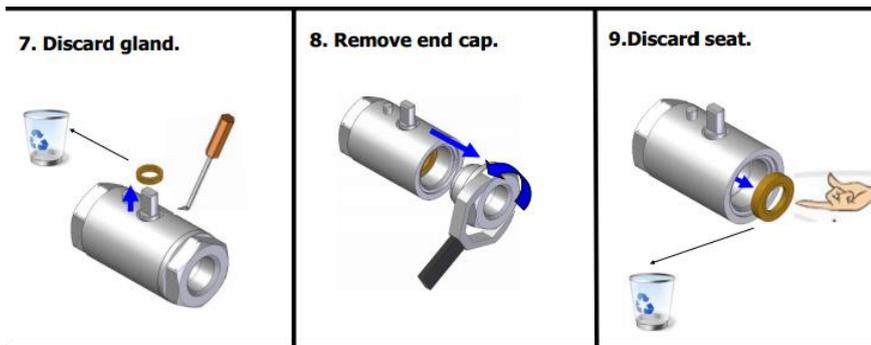
To disassemble the valve:

**CAUTION:** Take care when disassembling the valve, as a lot of parts look similar.

- Undo the pipework and remove the valve and actuator
- Undo the four Allen screws and remove the actuator from the valve
- Remove the drive dog (note orientation)
- Undo clamp (note orientation of clamp in relation to flow direction)
- Remove valve from the clamp
- Fold down metal locking tab
- Remove nut and tab



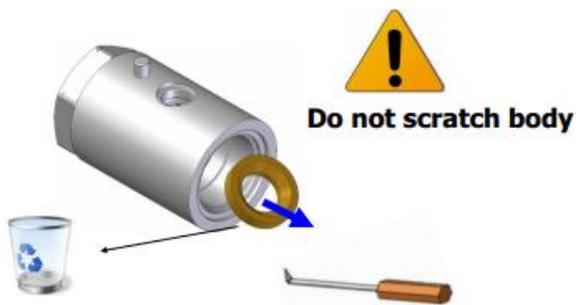
- Use a pick to pull out the stem seal and discard.
- Undo the end cap, remove the valve seat and discard it.



- Turn the valve stem to the “Closed” position then tap on the end of the ball valve with a wooden or soft plastic dowel (BV ASST) to remove it. Discard the ball.
- Push the valve stem down into the valve and remove it from the valve body. Discard the valve stem.



1. With a pick, carefully remove the second valve seat taking care not to scratch the internal surfaces of the valve. Discard the valve seat.
2. Remove and discard the O-ring from the end cap.



## Service kit

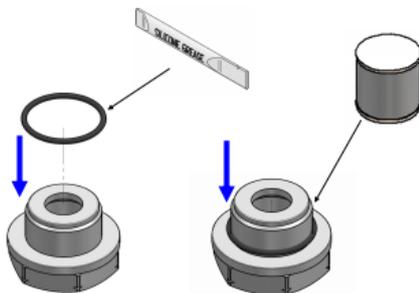


## Suggested service tools



To replace the valve:

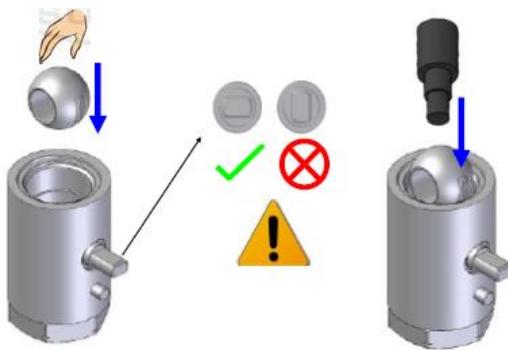
- Thoroughly clean and dry the valve body and end cap.
- Place the new O-ring on the end cap and lubricate with the supplied grease. Put an anti-seize compound on the threads.



- Fit the new valve seat making sure it is seated properly. Insert the valve stem into the valve body and pull it upwards until it clicks into place.



- With the valve stem in the “Closed” position, insert the ball so the slot engages with the stem.



- Insert the second valve seat
- Install the end cap and tighten to 60 N/m
- Install the valve stem gland then the lock tab and nut. Tighten nut to 3 N/m and bend the lock tab to stop the nut undoing
- Hold the valve stem with pliers and open and close the valve four or more times to bed in the seal. Leave the valve in the closed position
- Reinstall the bracket, drive dog and air actuator
- Reinstall the assembled valve and connect pipework
- Repower the dispenser and check for correct operation of the valve and for any leaks

**DANGER:** Do not use thread tape or sealing compounds on parallel SAE fittings.

**CAUTION:** O-rings that are subjected to natural gas at high pressure swell when exposed to air. Once swollen, they cannot be reused and must be replaced.

## Bleed Valve Replacement

The bleed valve seldom gives problems and is not serviceable.

For a replacement valve and instructions if required, contact your Compac service agent with your Model and Serial numbers.

## Pressure Relief Valve Replacement

The pressure relief valve seldom gives problems and is not serviceable.

For a replacement valve and instructions if required, contact your Compac service agent with your Model and Serial numbers.

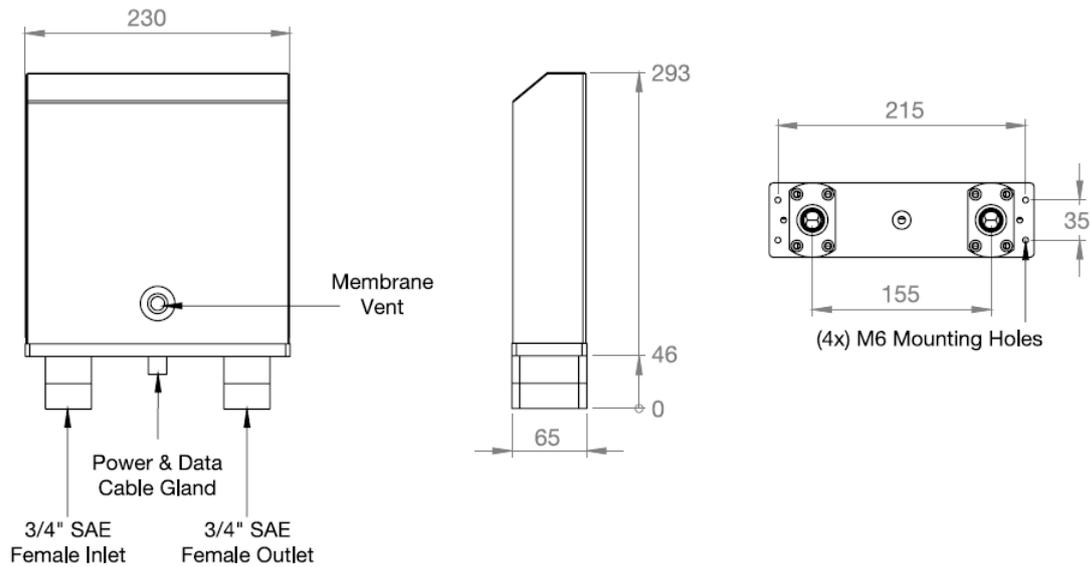
## KG80 Meter Replacement

To remove the meter:

- Shut off gas supply and degas the meter.
- Remove the inlet and outlet pipes from the old meter.
- Unscrew the SAE fittings from the meter inlet and outlet.
- Take note of the position and orientation of the communications plug then unplug the meter cable from the C4000 processor board and cut any cable ties that hold it in place.
- Undo the four bolts that hold the meter on the dispenser frame.
- Remove the old meter.

To replace the meter:

- Secure the new meter to the dispenser frame using the four bolts.
- Plug the communications cable into the C4000 processor board.
- Screw the SAE fittings into the meter inlet and outlet.
- Install the inlet and outlet pipes.
- Cable tie the communications cable to avoid pulling or damage to it.
- Pressurise the meter and check for leaks.
- Calibrate the meter in accordance with the instructions in the dispenser service manual.



## Compac Breakaway Seal Replacement

This section describes how to replace the seal in a QBCI model breakaway.

The Compac Breakaway QBCI is only used on 15 kg/min models or on models where the vent is returned to the dispenser.

The excess flow end (female) and check valve end (male) should not require servicing. Both have metal to metal seats that are not affected by dirt.

Before you start, obtain the following replacement parts and ancillary equipment:

- A seal kit - Part number FC-SK-0011
  - 3 x O-rings
  - 2 x probe O-rings
- O-ring lubricant

To reassemble the breakaway:

In the event of a breakaway, check the O-rings in the male end of the breakaway for damage.

If they are damaged, replace the breakaway QBCI seals by following the steps below.

To replace the breakaway seals:

- Remove the old O-rings.

**NOTE:** *If you are dismantling the quick breakaway valve, make sure that you have a spare seal kit available. O-rings that are subjected to natural gas at high pressure swell when exposed to air and must be replaced.*

- Replace the old O-rings with the new lubricated O-rings.

**NOTE:** *Always use O-ring lubricant to prevent the O-rings from being damaged.*

If the breakaway parts under gas pressure for no apparent reason check that the pressure relief hole is clear. If the pressure relief hole is blocked, gas pressure will force the male and female ends apart.

To reconnect the breakaway:

- Make sure that both male and female receptacle breakaway parts are clean before reassembly.
- Check that the pressure relief hole is clear.

**NOTE:** *If the pressure relief hole is not clear, gas pressure will force the male and female ends to part.*

- Firmly connect the female and male connectors.

**NOTE:** *If the breakaway is not connected correctly when gas pressure is applied, it will come apart completely.*

## Three-Way Refuelling Valve Seal Replacement

**NOTE:** Make sure you identify the valve before disassembling it to make sure you have the correct seal kit available. For more information see Compac Technical bulletin CTB10015.

Before you start, obtain the following replacement parts and equipment:

Seal Kit Part Number is FC-SK-0049

Three-way valve ball spindle is FC-SVK-0002 (optional)

To remove the three-way valve seals:

**CAUTION:** Take care when disassembling the valve, as a lot of parts look similar.

- De-pressurise the valve and remove it from the hose assembly.
- Disassemble the valve, as per the figure on the next page.

*Clean all components with a clean dry lint free rag.*

**CAUTION:** O-rings that are subjected to Natural Gas at high pressure. Swell when exposed to air. Once swollen they must be replaced.

- Blow compressed air (100 psi) through all ports to remove any impurities that may damage the seals in operation.

**CAUTION:** Wear appropriate safety eye wear when using compressed air.

To install new three-way valve seals:

- Cut the handle shaft back-up ring on an angle so it can be fitted onto the shaft

**NOTE:** Check that the back-up rings are free of burrs and sharp edge.

- Position the seals in the appropriate slots on the handle shaft.

**CAUTION:** O-rings that are subjected to Natural Gas at high pressure swell when exposed to air. Once swollen they must be replaced.

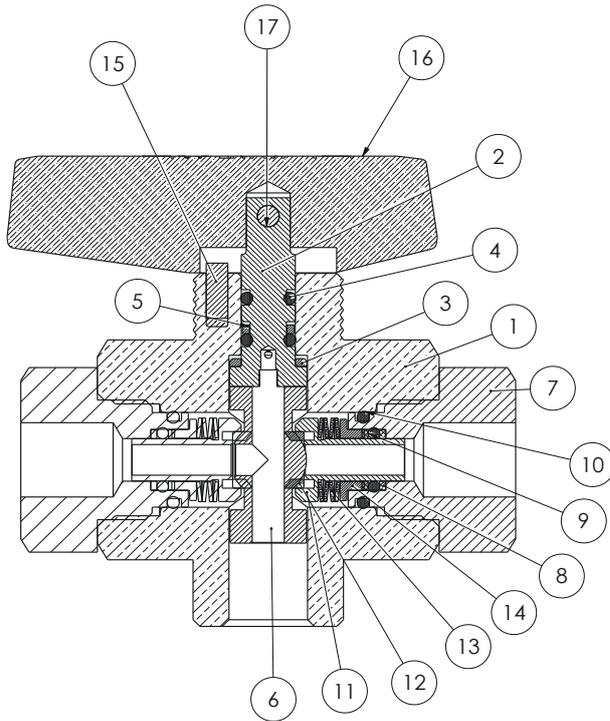
- Insert the handle shaft into the valve body from the bottom.
- Insert the ball shaft into the valve body from the bottom.

**NOTE:** Ensure that the slotted handle shaft and ball shaft engage.

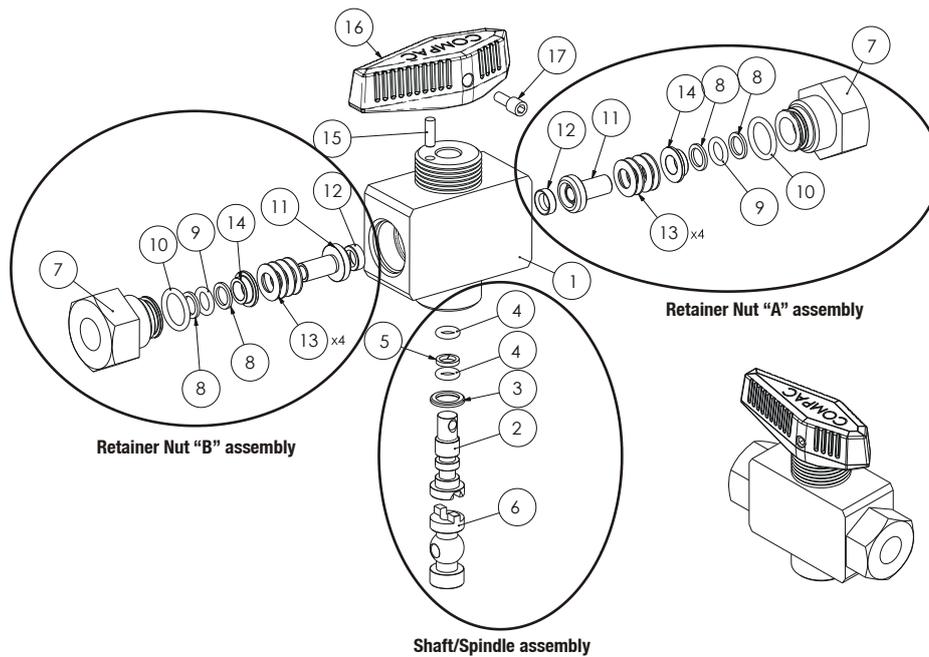
- Insert the ball shaft seals in both sides of valve body.
- Insert the ball shaft retainers in either side of the valve body until the retainer face meets with body of the valve.
- Place the handle on the handle shaft and screw in the grub screw to lock it in place.



# Compac Refuelling Valve Exploded View



ITEM NO.	QTY.	DESCRIPTION	PART NUMBER
1	1	3-Way Valve Body	D-3WAY-B
2	1	3-Way Valve Handle Shaft	D-3WAY-HSH
3	1	Teflon Spindle Washer	D-3WAY-SPTW
4	2	Nitrile Oring ID4.5 x 1.8	D-ORING-008-N70
5	1	Teflon Spindle Back Up Ring	D-3WAY-SPTBR
6	1	3 Way Valve Ball Spindle	D-3WAY-BSP
7	2	3-Way Valve Retainer Nut	D-3WAY-RET
8	4	Teflon Inlet Back Up Ring	D-3WAY-ITBR
9	2	Nitrile Oring ID6.3 x 1.7	D-ORING-010-N70
10	2	Nitrile Oring ID11 x 1.8	D-ORING-013-N70
11	2	3-Way Valve Seal Shaft	D-3WAY-SSH
12	2	3-Way Valve Seal Shaft Seat	D-3WAY-SSHS
13	8	3-Way Valve Dome Washer	D-3WAY-DWSHR
14	2	3-Way Valve Seal Shaft Bush	D-3WAY-SSHB
15	1	3-Way Valve Handle Stop	D-3WAY-HSTP
16	1	3-Way Valve Handle	D-3WAY-H
17	1	3-Way Valve Handle Screw	D-3WAY-HGSCR



Servicing

## Refuelling Hose Replacement

To remove the refuelling hose:

- De-gas the dispenser.
- Undo the JIC hose connection at the dispenser's outlet block.
- Undo the connection between the hose and the nozzle assembly.

To install the new refuelling hose:

- Attach the nozzle assembly to the new hose.
- Attach the new hose to the dispenser at the outlet block.
- Re-gas the dispenser and push the **Start** button to fill the new hose assembly with gas.
- Check all hose connections for leaks by applying soapy water mixture and looking for bubbles.

## Power Supply Fuse Replacement

**NOTE:** There are three fuses used in the C4000 power supply, and each fuse has a different rating.

**NOTE:** F2 is soldered to the board and, if this fuse is blown or faulty, the whole power supply will need to be replaced.

Before you start, make sure you have:

The following fuses with these ratings:

- F1 = 0.5 A
- F3 = 1.0 A
- OR Compac fuse kit F-C4PWR-FKE

Fuse locations are displayed on the C4000 Power Supply Board

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

To remove the C4000 power supply 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 C4000 power supply 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-C4PWRASS230**

To remove the C4000 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 C4000 power supply board.

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

- Disconnect the incoming power wiring from the phase and neutral terminals, and from the earth bar.
- Remove all the solenoid and communications plugs on the top of the C4000 power supply board, with the wiring still intact.
- Remove the screws that are securing the earth bar, taking care not to lose any of the spacers or other mounting hardware.
- Remove the two screws on the other end of the C4000 power supply board.
- Carefully slide out the C4000 power supply board to gain access to the plugs on the IS Cable that connect into the bottom PCB, and unplug these.

Completely remove the C4000 power supply board.

To install the new C4000 power supply:

- To install the new C4000 power supply, reverse the procedure above.

**CAUTION:** Make sure that the triac snub switches SW1, SW2, & SW4 are left in the factory set position 2 (Low Current Output) after you have completed all procedures. Switches are easily knocked out of position during service. The C4000 Power Supply Board section shows the appropriate switch settings used on the dispenser.

**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 C4000 Processor part number **F-CP-C4PROCES-A**

To remove the C4000 processor board:

- De-gas the dispenser.
- Remove the cover of the C4000 enclosure.
- If possible, record all the set-up data by accessing the **Parameter** switch (SW1) and the **K-Factor** switch (SW2). The Software Set-Up and Upgrade section contains details on obtaining this information.
- Switch off the power supply to the dispenser.
- Remove both the EPROM and memory chips Dispenser Software Upgrade/Replacement.

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

- Unplug all wiring from the C4000 microprocessor board and remove the board from its position.

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

To install the new C4000 processor board:

- Put the new board in place of the old one, and plug all the wiring back in the same order as before.
- Refit the EPROM and memory chips, as per Dispenser Software Upgrade/Replacement
- Check dispenser operation Checking Dispenser Operation

**NOTE:** *It should not be necessary to recalibrate the dispenser.*

## Temperature Pressure Board Replacement

### (Fast Fill & Temperature compensation Units Only)

Before you start, obtain the following replacement parts

- Replacement Temperature and Pressure board part number: **F-CP-CNG-TEMP**

To remove the temperature pressure board:

- 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.

- Access the temperature pressure board.

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

Unplug all wiring from the temperature pressure board and remove the board from its position.

To install the new temperature pressure board:

- Put the new board in place of the old one and plug all the wiring back in the same order as before.
- Turn the power to the dispenser back on.
- Check Dispenser operation. Checking Dispenser Operation.

**NOTE:** *It should not be necessary to re-calibrate the dispenser unless a pressure transducer or temperature probe needs to be replaced.*

## Dispenser Software Upgrade/Replacement

You can only upgrade the dispenser software by replacing the EPROM chip. Follow this software upgrade procedure for all CNG Dispensers that use the C4000 Microprocessor.

**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 C4000 Microprocessor PCB by opening the front panel.
- Record all the set-up data by accessing the **Parameter** switch (SW1) and the **K-Factor** switch (SW2). Refer to Parameter Switch Settings and K-Factor Switch Settings to obtain this information.

The following data is required from the **Parameter** switch (SW1):

- Dispenser pump price.
- Dispenser pump number.
- Dispenser sequencing rate.
- Software Program number, if you are upgrading to a new version.

The following data is required from the **K-Factor** switch (SW2):

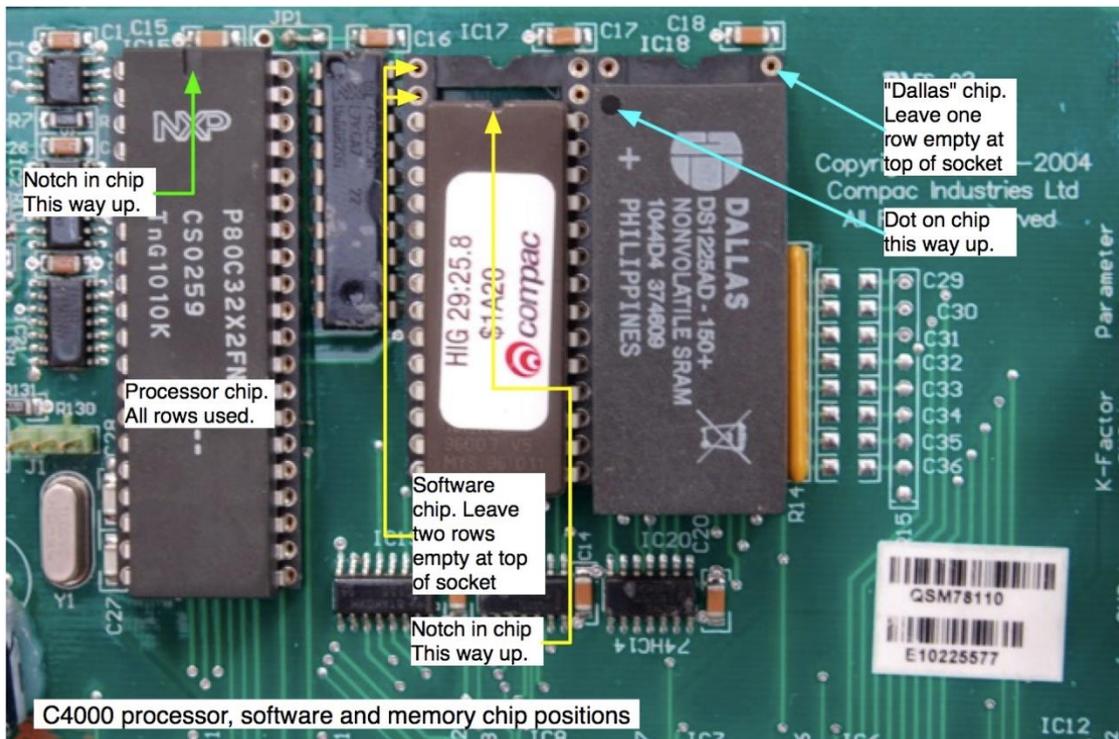
- The K-Factor. There is a value for side A and side B in dual hose dispensers.
  - The temperature.
  - The Set Resolution. This sets the number of decimal places after the decimal point.
  - The pressure values. (Record if applicable:  $u$   $uA$   $uA2$   $ub$   $ub2$ )
  - The pressure gain. (Record if applicable:  $GA$   $in$   $GA$   $inA$   $GA$   $inb$   $GA$   $inA2$   $GA$   $inb2$ )
  - Configuration Code C.
  - Configuration Code b.
  - The Density Factor.
- Record the tote information by pressing the nozzle switch or start button quickly five times

To remove the software EPROM:

- Turn off the dispenser.
- Remove the software EPROM chip, using an EPROM extractor

To install the new software EPROM:

- Plug in the new software EPROM, checking that all of the legs are correctly located in the socket. The chip should be located as far to the bottom of the socket as possible. This leaves a gap of two pins from the top of the chip to the top of the socket. Pin 1 of the EPROM is then located in the top left corner (pin 3 of the socket).
- Turn on the dispenser.
- Check that the initial set-up data and tote information is the same.
- If the initial set-up data is different, re-enter this information, as per Parameter Switch Settings and K-Factor Switch Settings.
- Check the dispenser operation Checking Dispenser Operation.



## Meter Replacement

Before you start, make sure you have:

- A new Compac meter F-D-METER-KG80T

To remove the Meter:

- De-gas the dispenser.
- Remove the tubing from the meter inlet and outlet.
- Unscrew the SAE fittings from the meter inlet and outlet.
- Unplug the meter connections to the C4000 processor.
- Undo the four bolts that hold the meter on the dispenser frame.
- Remove the meter.

To install the new meter:

- Reverse the steps above to install the new meter.
- Enter the new meter K-Factor into the C4000 processor Meter K Factor.
- Check the dispenser calibration with the master meter. Refer: Meter Calibration.

## Unserviceable Parts List

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

Part	Comment
<b>KG Meter</b>	The KG meter: <ul style="list-style-type: none"> <li>- Can have its firmware upgraded by approved service agents.</li> <li>- Can only be serviced by Compac.</li> <li>- Has no set-up functions.</li> <li>- Is self-characterising. The only function performed in the set-up is setting the K- Factor on the C4000 head.</li> </ul>
<b>C4000 Power Supply</b>	
<b>C4000 CPU Board</b>	
<b>Nozzles</b>	
<b>Solenoid Stem</b>	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, with the nozzle in its holster.
- Press and release the **K-Factor** switch nine times.
- The display shows the K-Factor as **F \*\*\*\*\*** (single nozzle dispenser) or **F A \*\*\*\*\*** (Side A of a dual nozzle dispenser).
- To view the K-Factor for side B, quickly press and release the **K-Factor** switch eight more times when viewing side A. The display shows **F b \*\*\*\*\*** (side B of a dual nozzle dispenser).

**NOTE:** With a dual dispenser, it's easier to set side A first.

Calculate the new K-Factor with the following formula:

$$\text{New K Factor} = \frac{\text{Existing K Factor} * \text{True quantity}}{\text{Displayed amount}}$$

**For example:**

Existing K Factor = 0.98

Displayed amount = 5.80kg

True quantity = 6.00kg

$$\text{New K Factor} = \frac{0.98 * 6.00}{5.80} = 1.0138(4dp)$$

To input dispenser settings:

- Input the new meter K-factor (**FA & Fb**).
- 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 CNG cylinder with a fill and release valve

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

- Put the CNG cylinder on the scales.
- Empty the CNG 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 CNG 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

### (Fast Fill & Temperature Compensated Units Only)

Calibrating the dispenser pressure transducers involves two steps:

- Determine the transducer gain. Compare the dispensers gauge pressure to its electronic pressure reading to determine and set the correct transducer gain.
- Adjust the transducer gain by adjusting the dispenser's electronic pressure reading to match the actual pressure.

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

To determine transducer gain:

- Degas the dispenser and close all outlet isolation valves
- View and note down the current transducer gain (TG) setting for the transducer to be tested. Pressure Transducer Gain.
- 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 100 bar.
- Hang up the nozzle.
- View and record the electronic pressure reading for the pressure transducer. This value is D1.
- Record the value on the dispenser gauge. This value is TG1.
- Remove the nozzle from its holster again or press the start button.
- Increase the gauge pressure to approximately 200 bar.
- Hang up the nozzle.
- View and record the electronic pressure reading for the pressure transducer. This value is D2.
- Record the value on the dispenser gauge. This value is TG2
- Calculate the new gain using the following formula:

$$\text{New Gain} = TG * \frac{TG2 - TG1}{D2 - D1}$$

To adjust the transducer gain:

Input the new gain. Refer Pressure Transducer Gain.

To adjust the electronic pressure offset, adjust the electronic pressure reading to equal that displayed on the dispenser's pressure gauge using the following procedure:

- Use the "K" factor switch to display the pressure reading.
- Press and hold the "K" factor switch to change the display to equal the pressure on the gauge.
- Allow the "K" factor setting to time out.
- Re-check the pressure at 100 and 200 bar gauge pressure to see if display and gauge read the same.

## **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.

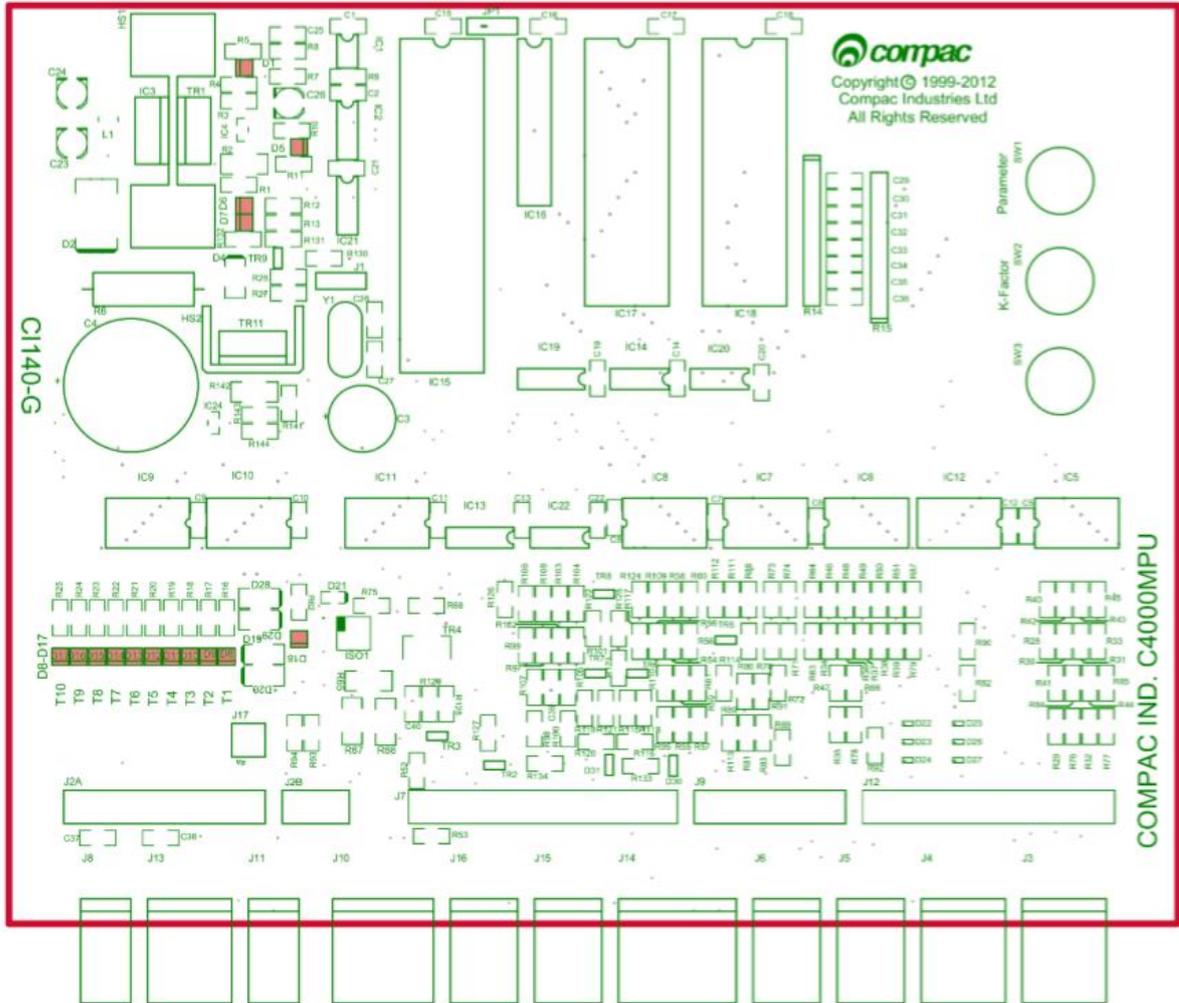
Access the current dispenser ambient temperature reading.

To adjust the dispenser reading:

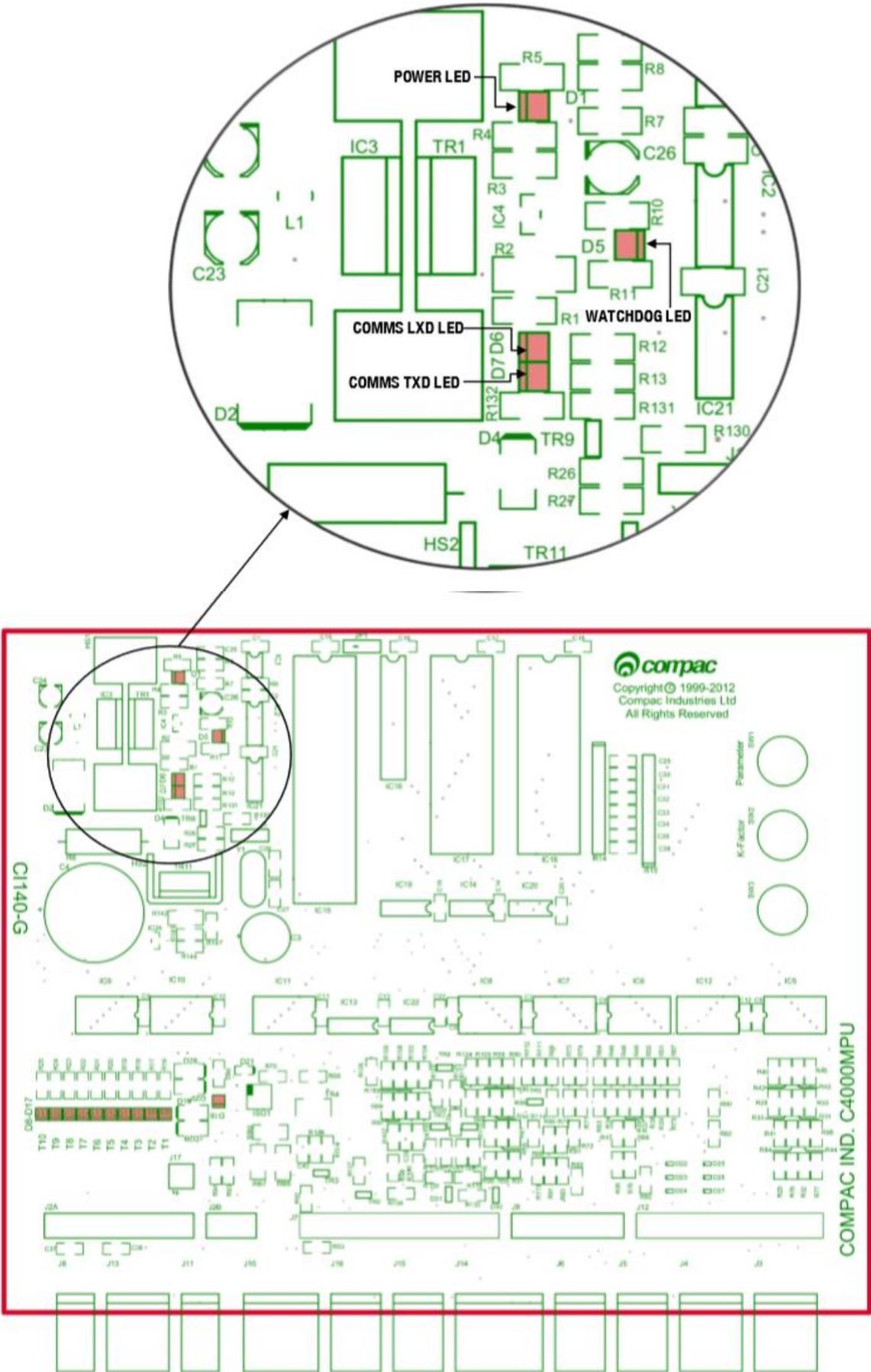
Adjust the dispenser's ambient temperature reading to match that of the calibrated temperature meter.

# Indicator LEDs

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



# Indicator LEDs





Indicator LEDs	LED	Reference	Description
	Power	D1	Indicates power is being supplied to the processor board. If it is not lit there is a fault on the processor power supply.
	RXD	D6	Flashes when polling information is being received.
	TXD	D7	Flashes when polling information is being sent.
	Diagnostic	D18	Provides diagnostic information (see below).
<b>Diagnostic LED</b>	The diagnostic LED D18 flashes in three different states when the processor is working properly, as outlined in the table below.		
	<b>State</b>	<b>LED Flashes</b>	<b>When</b>
	<b>1</b>	Slowly and consistently.	The hose is idle and in stand-alone mode.
	<b>2</b>	Slowly but erratically.	The hose is idle and communicating with a Controller.
	<b>3</b>	Quickly.	The start button is being pressed or the nozzle has been lifted from its holster.

## Appendix

The C4000 electronic head 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 C4000 lid and the flameproof junction box lid.

ATEX Approval Marking on the Equipment	Equipment or Protective System	EC - Type Examination Certificate Number
II 2 G EEx d II A T3 ( $T_{amb}$ = -25°C to + 55°C)	A Type C4000 Control Unit	Baseefa03ATEX0612
$\varepsilon$ II (2)G [EEx ib] IIA (-25°C ≤ Ta ≤ 80°C)	C4000 Power Supply Unit PCB CI138 & CI139	Baseefa03ATEX0684X
$\varepsilon$ II G EEx ib IIA T3 (-25°C ≤ Ta ≤ 80°C) (CWIT Aerial only:- $\varepsilon$ II 1G EEx ia II A T3	C4000 Fuel Dispenser Control Unit	Baseefa03ATEX0683X
The Compac CNG equipment is also PED approved for use up to 275 bar.		

PED Approval Marking on the Equipment	Equipment	EC - Type Examination Certificate Number
$\chi$ Cat. II Group I	Filter housing, Solenoid, & various Dispenser models.	SGS UK Ltd. 0790/025074

# Specifications

## Model Specifications

There are various CNG 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-CNG15	L-CNG50 L-CNG50-15	L-CNG80 L-CNG80-15
	Dual	L-CNGD15	L-CNGD50	L-CNGD80
Legend	Single	LGDCNG15	LGDCNG50 LGDCNG50-15	LGDCNG80 LGDCNG80-15
	Dual	LGDCNGD15	LGDCNGD50	LGDCNGD80
		LE3KG25D (Pakistan only)		

## Technical Specifications

Operating Conditions:

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

CNG Dispensers require the following operating conditions:

CNG 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 (CNG)
	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)
<b>General Specifications</b>	Power Requirements	230V +/-10%, 50Hz, 2A

Specific Specifications	Standard Model	High-Flow Model	Ultra-High-Flow Model
<b>Flow</b> (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
<b>Pressure rating</b> (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
<b>Accuracy</b>	+/- 1.0%	+/- 1.0%	+/- 1.0%
<b>Meter</b>	Compac KG80 coriolis mass flow	Compac KG80 coriolis mass flow	Compac KG80 coriolis mass flow
<b>Internal Pipework</b>	1/2"	1/2"	1/2" or 3/4"
<b>Refuelling hose</b>	3/8"	1/2"	1/2" or 3/4"
<b>In-line breakaways</b>	Various available	Various available	Heavy duty
<b>Refuelling valve</b>	NGV1 or NZ 7/16" probe	NGV1 or NGV2	NGV2
<b>Laser (without hoses or high masts)</b>	830W x 450D x 1608H	830W x 450D x 1608H	830W x 450D x 1608H
<b>Legend (without hoses)</b>	850W x 425D x 2355H	850W x 425D x 2355H	850W x 425D x 2355H
<b>Minimum flow cut off</b>	0.5 -10 kg/min (settable)	0.5 -10 kg/min (settable)	0.5 -10 kg/min (settable)
<b>Maximum flow cut off</b>	10 - 99 kg/min (settable)	10 - 99 kg/min (settable)	10 - 99 kg/min (settable)

## Component Specifications

See below for information on serviced equipment.

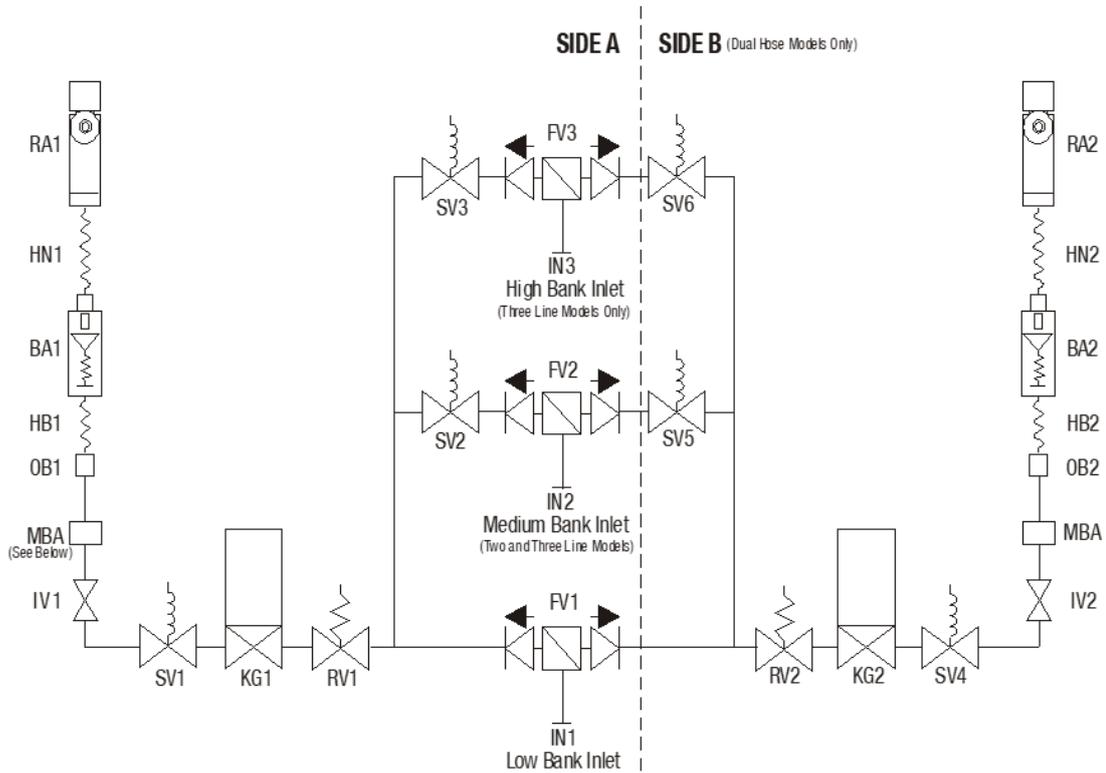
Equipment Item	Compac Code	Specifications	Description
<b>Coalescing filters</b>		Grade 10 Coalescing Filter	The coalescing filters are designed to trap dirt, moisture, oil, and other debris that may damage the valve seals. A Grade 10 coalescing filter will remove 95% of liquid aerosols in the 0.3 to 0.6 micron range.
<b>Compac filter/check valve</b>	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.
<b>Solenoid valve</b>	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 CNG Dispenser.  Between the inlet and outlet, the valve opens with a differential pressure of more than 275 bar.
<b>Regulator valve</b>	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 <b>fixed pressure dispenser</b> , the regulator limits the final fill pressure to 200 bar.  In the <b>temperature compensating dispenser</b> , 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
<b>Three-way refuelling valve</b>	RVCI-04	1/4" NPT ports 250 bar max.	The three-way valve is designed specifically for refuelling CNG 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.
<b>Nozzles</b>	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.
<b>Inline breakaways</b>	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.
<b>Isolation ball valve</b>			Parker 2-way 8 series ball valve
<b>Micro-processor</b>	C4000		The Compac C4000 processor controls all the electronics in the dispenser.

# Specifications

Equipment Item	Compac Code	Specifications	Description
<b>Display</b>	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.)
<b>Pressure Gauge</b>			Dual scale pressure gauges are available with psi and either bar, MPa, or kPa. CE Approved
<b>Hose</b>		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.

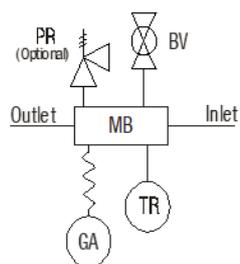
# Hydraulic Layout



**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 model 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 CNG 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

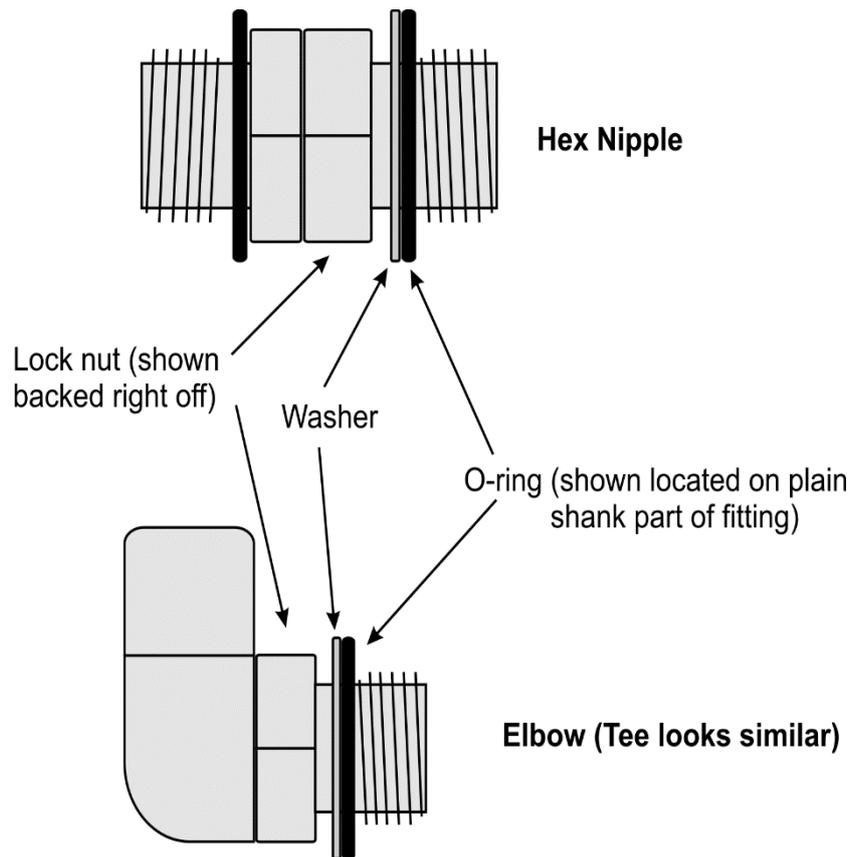
1. Inspect the components ensuring that the threads and sealing faces are clean and undamaged.
2. Lubricate the O-ring with a light oil.
3. Screw the components together by hand until the O-ring touches the face of the port.
4. Tighten the fitting firmly with a suitable spanner.

**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.



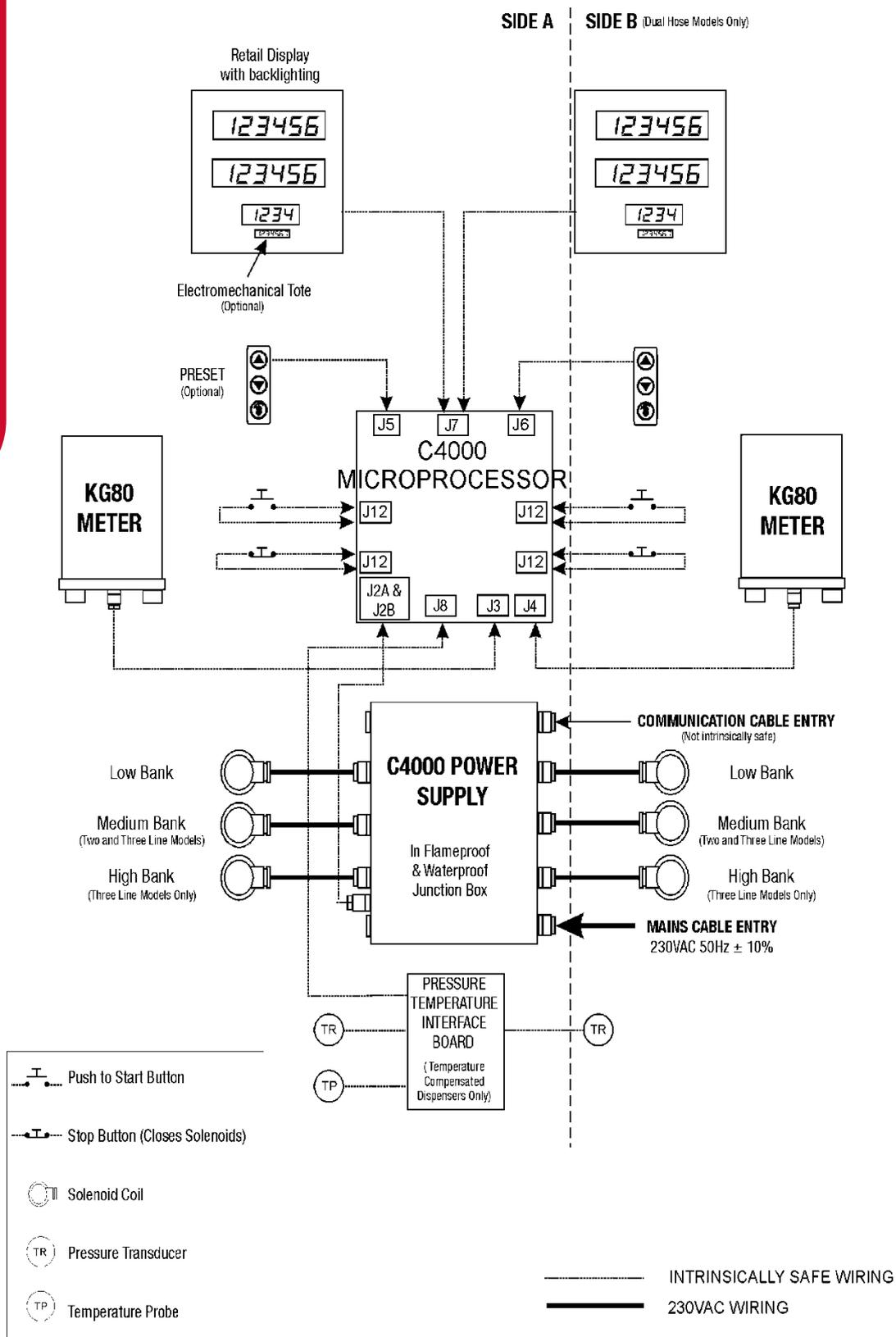
### Connecting Compression Tube Fittings

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.

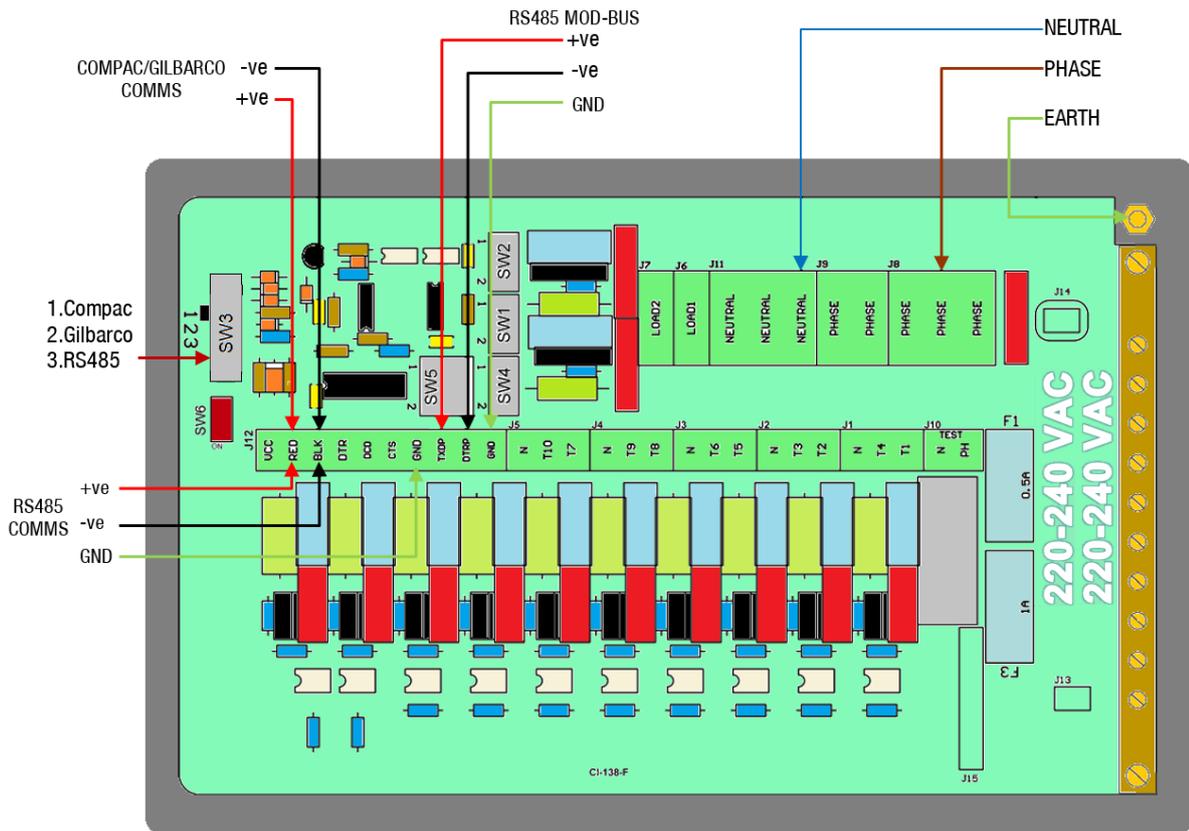
**NOTE:** Correctly made tube should not need to be sprung into position.

# Electrical Drawings

## CNG Dispenser Electrical Schematic



## C4000 Power Supply Board



### C4000 IS Cable CNG Outputs

The C4000 controls the solid state relay switch. Solid state relay switches control the C4000 220-240 volt outputs.

## Solid State Relays (Triacs)

There are 10 separate solid state relays (small triacs) on the C4000 PCB. The output terminals for these triacs are T1 to T10. See below for information about the use of these outputs.

Power Terminal	Function
T1	Solenoid Low Bank Side A
T2	Spare
T3	Solenoid Medium Bank Side A
T4	Solenoid High Bank Side A
T5	Spare
T6	Solenoid Low Bank Side B
T7	Solenoid Medium Bank Side B
T8	Spare
T9	Solenoid High Bank Side B
T10	Auxiliary Output for Compressor Controller

Fuse	Rating	Comment
F1	0.5 A	Fuses F1 should be glass. F2 and F3 should be ceramic. All fuses are 5 x 20 mm <b>fast blow</b> type, and should comply with IEC127, 35 Amp minimum rupture current.
F2	0.25 A	
F3	1.0 A	

### Comms Dipswitches

SW3 on the C4000 Power Supply sets the comms for Compac, Gilbarco or RS485 protocols.

SW3	Comms Protocol
Position 1	Compac Standard
Position 2	Gilbarco
Position 3	RS485

### Triac Snubber Switches

Triac snubber switches are used to switch different snubber circuits across the solid state relays. On CNG Dispensers, these (SW1, SW2, and SW4) must always be set to low current output (2).

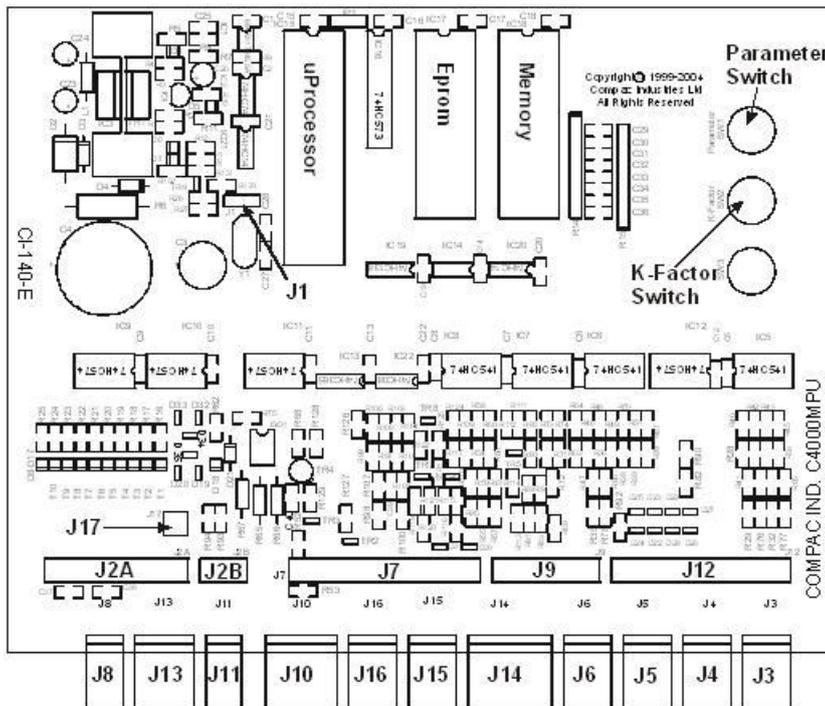
## C4000 Microprocessor Board

The Compac C4000 head is operated by a software program in an EPROM (which is located on the processor board). This program has several operational configurations, one of which must be selected using the set-up devices on the C4000 PCB.

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

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

The board shown below is Issue E. For older dispenser board layout information, contact Compac by using the contact details in the Product Identification section.



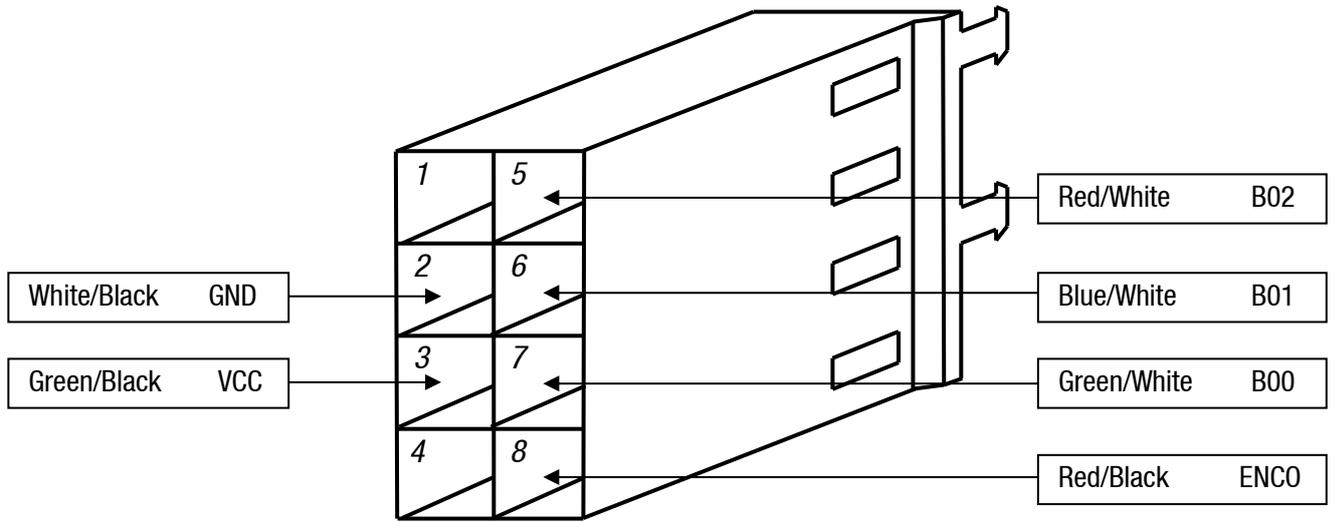
Terminal	Function	Terminal	Function
<b>J1</b>	Comms test	<b>J9</b>	Power for KG meters
<b>J2A</b>	To power supply	<b>J10</b>	Totes
<b>J2B</b>	To power supply	<b>J11</b>	Buzzer
<b>J3</b>	Input from KG meter side A	<b>J12</b>	Nozzle switches
<b>J4</b>	Input from KG meter side B	<b>J13</b>	Not used
<b>J5</b>	Preset module side A	<b>J14</b>	Not used

<b>J6</b>	Preset module side B	<b>J15</b>	Not used
<b>J7</b>	Displays	<b>J16</b>	Not used
<b>J8</b>	Temperature pressure module (for temperature and pressure compensation only)	<b>J17</b>	Backlighting

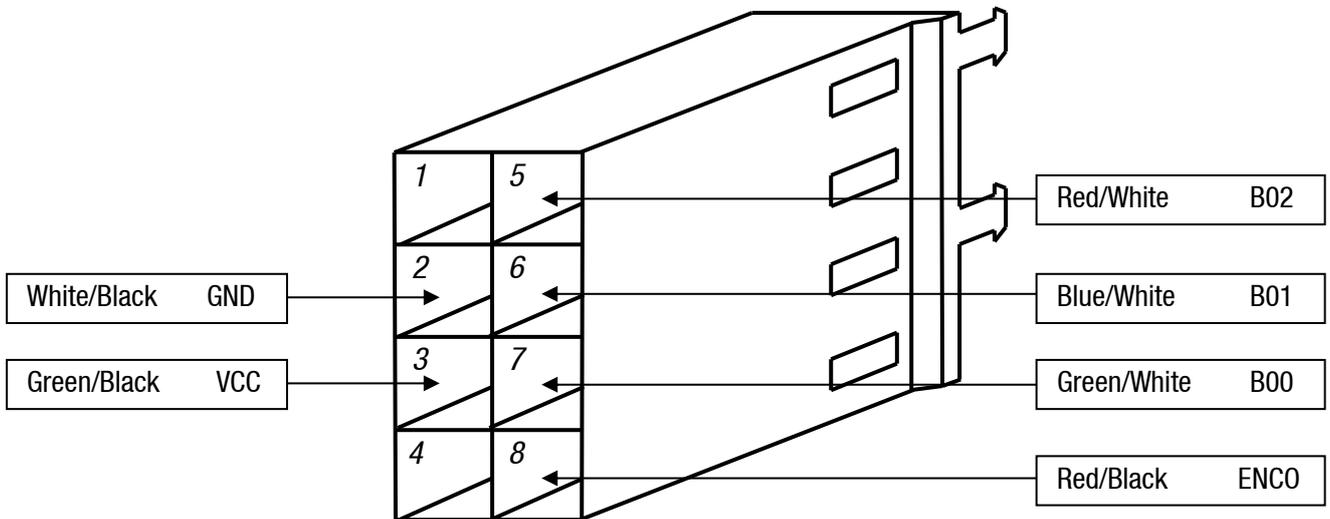
<b>J1 Cable Connection</b>	For de-bug use only. No link required.
<b>J2A Cable Connection</b>	Illustrated in the C4000 IS Cable Diagrams section.
<b>J2B Cable Connection</b>	Illustrated in the C4000 IS Cable Diagrams section.

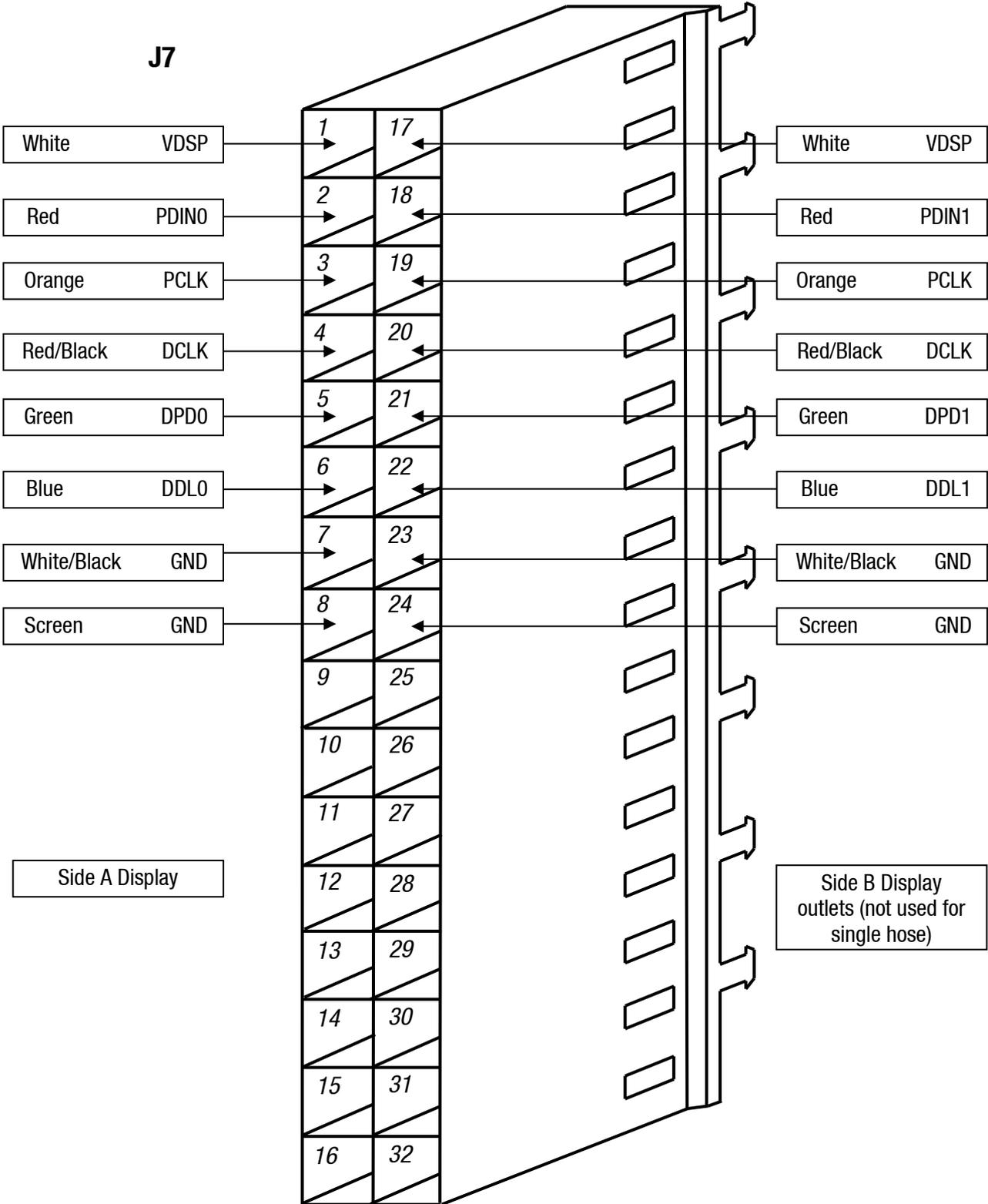
### J Cable Connections

#### J3

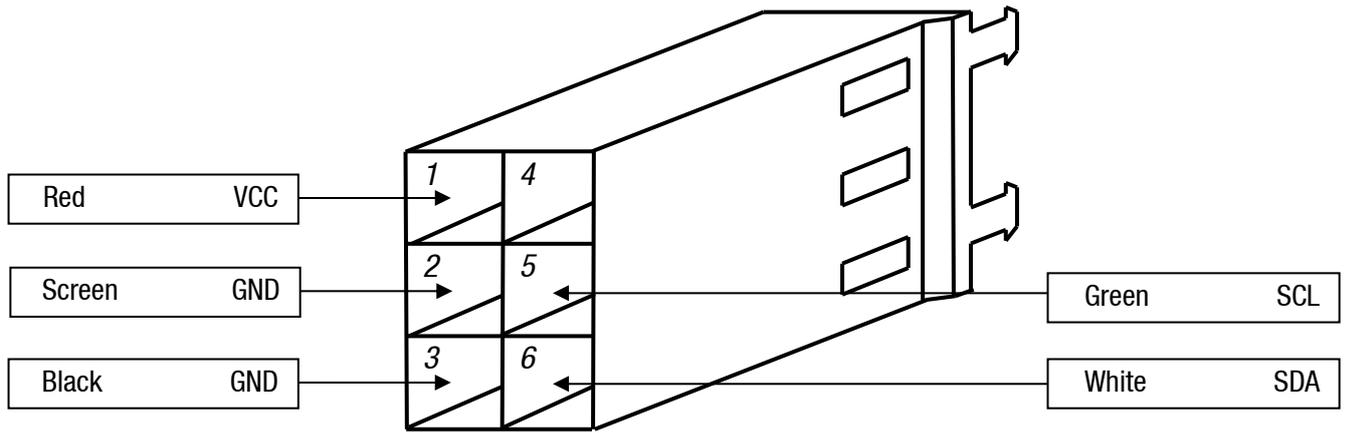


#### J4

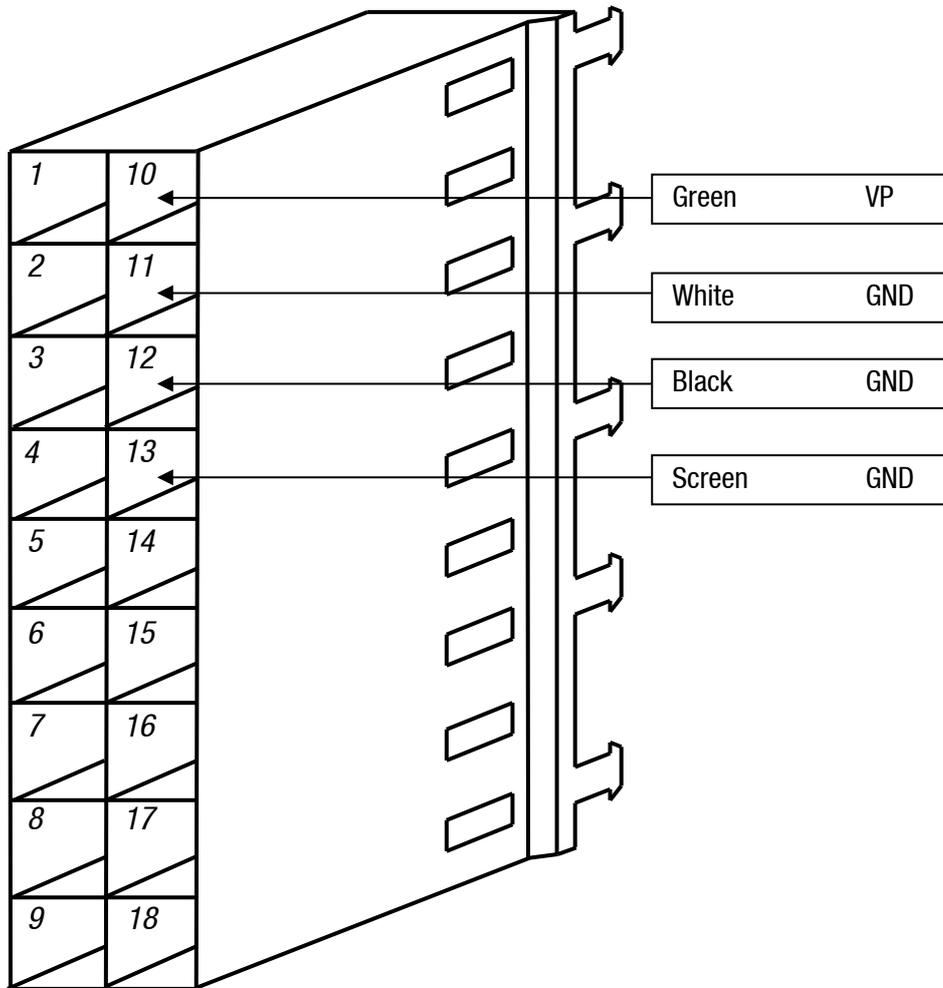




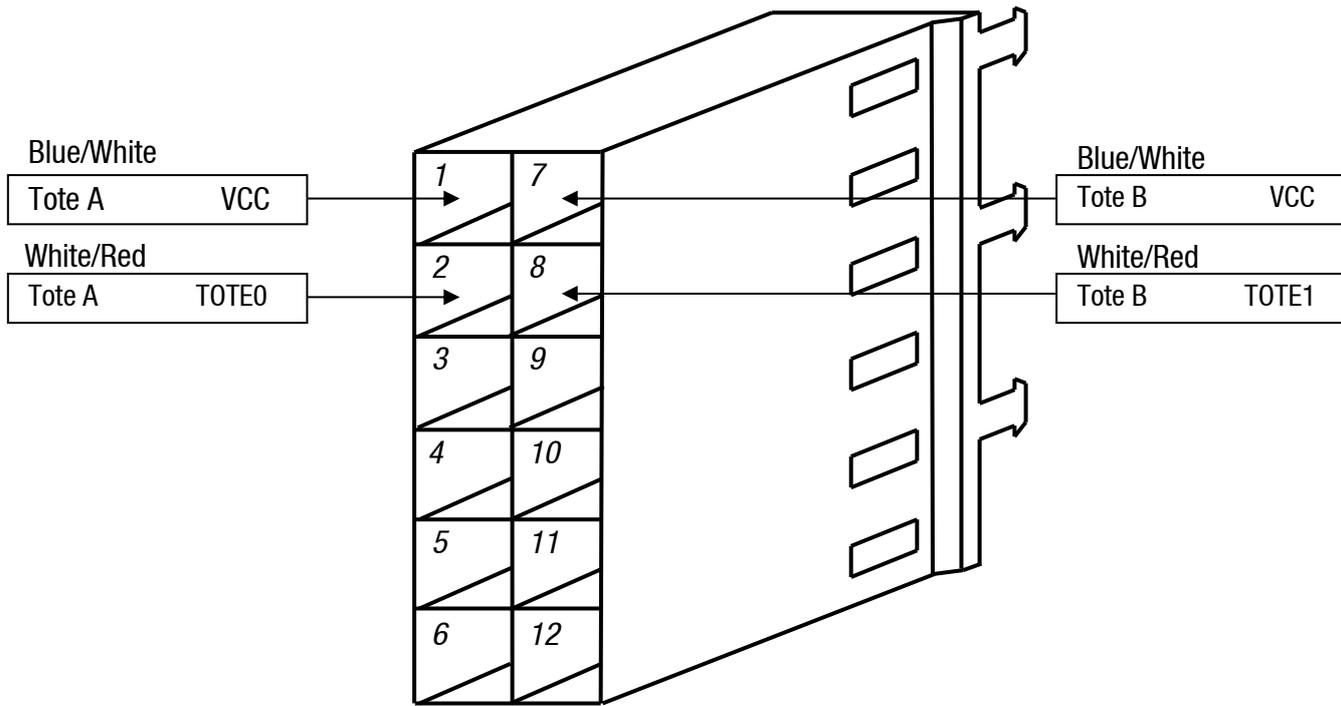
J8



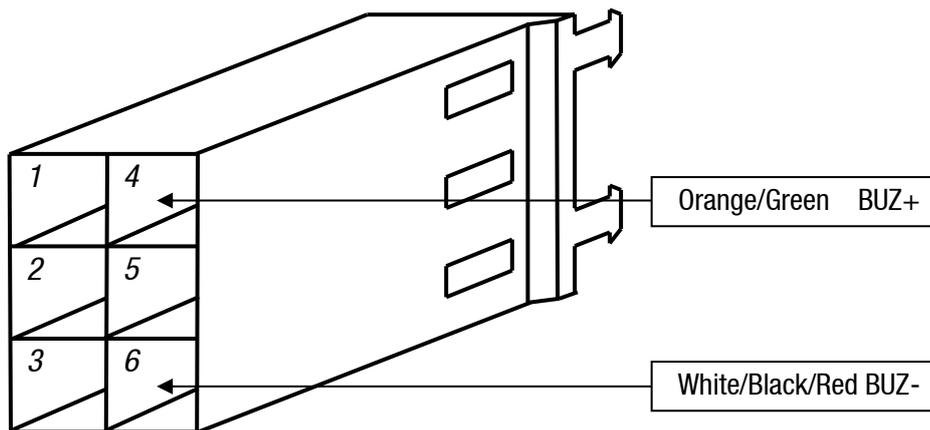
J9

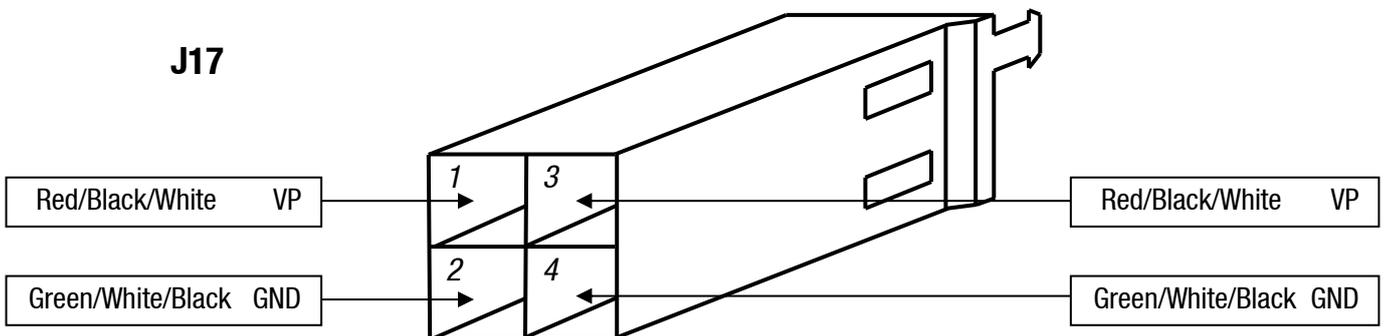
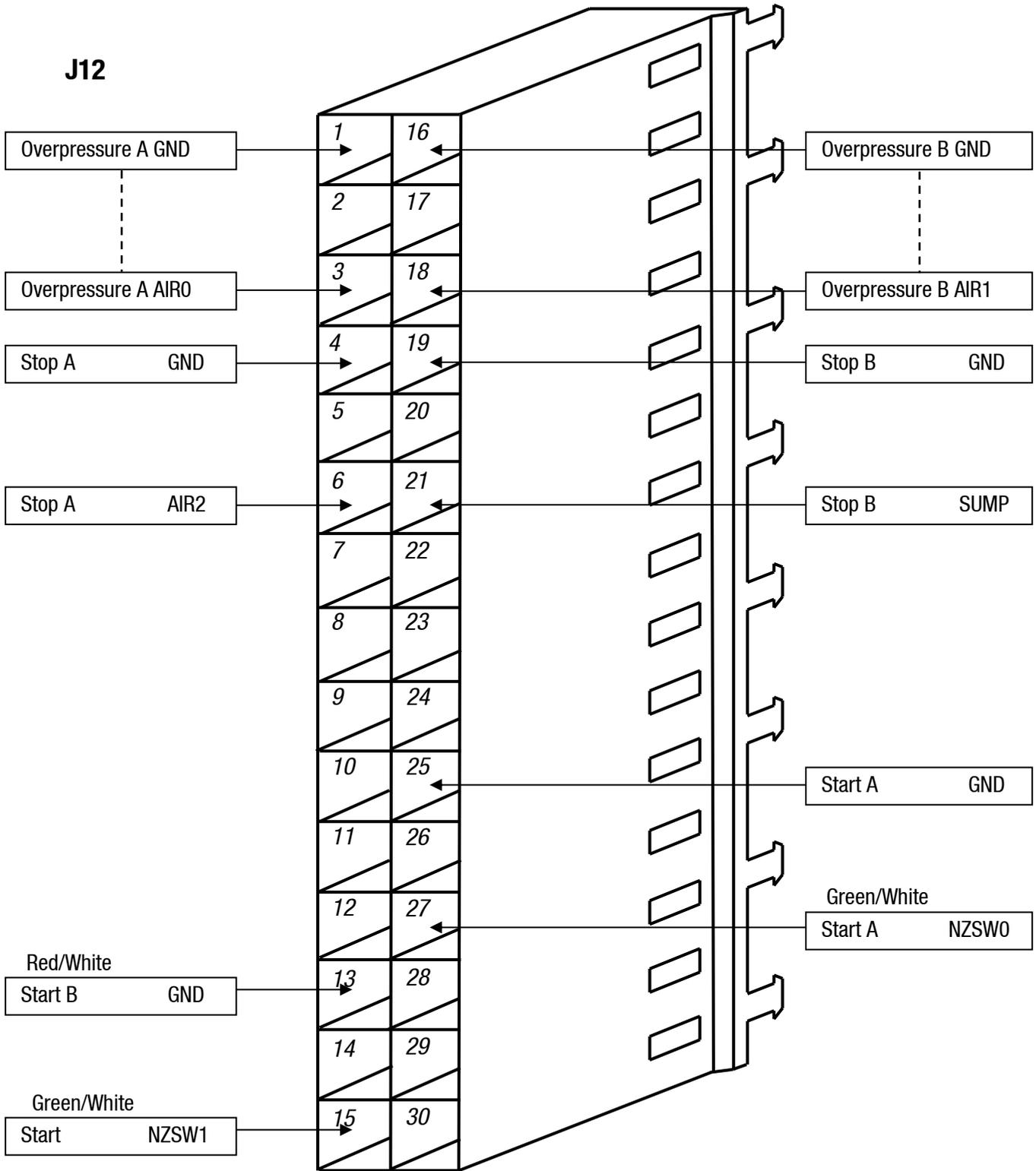


### J10



### J11





## RS485 MOD-BUS Wiring for Micro Motion Meter

The following changes are made to standard Compac dispensers to allow the use of RS485 communication with a Micro Motion meter.

C4000 Power Supply:

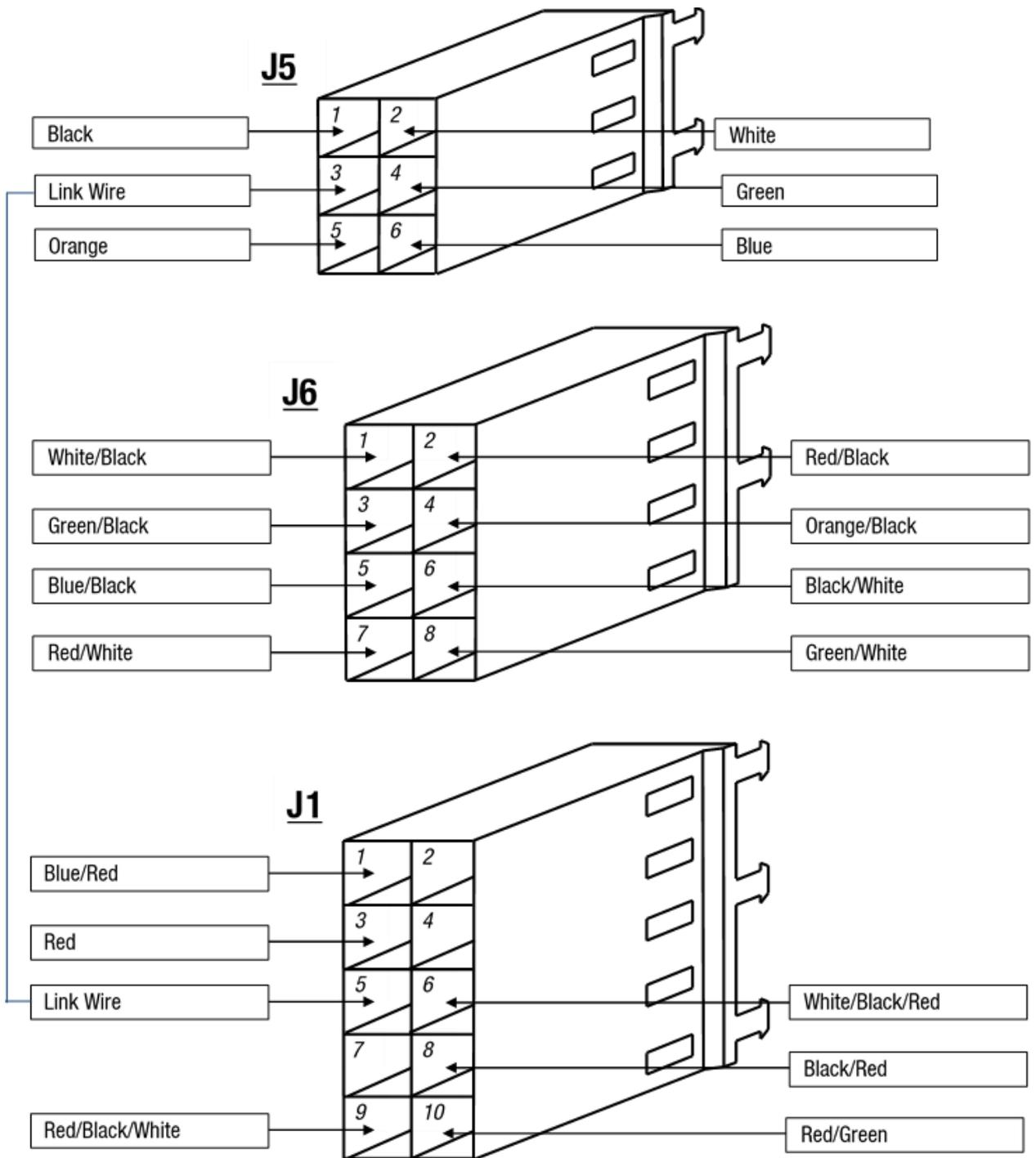
- An RS485 Board is fitted inside the Power supply flame proof box.
- The IS cable pinouts will need to be changed to match the wiring detailed below.
- An extra red wire will need to be added to link pin 5 on J1 to pin 3 on J5.
- The IS cable will need to have The Red / Black / White cable removed from J2A and put into pin 6 of J2B.
- A new plug will need to be made for J13 and the Black/Red and White/Black/Red wires removed from J2A and inserted into pins 5 and 9 as shown below.
- Special software to support the Micro Motion CNG50 meter will need to be installed. Please contact the Compac Helpdesk for the latest version.
- Connect the RS485 cable to the terminals on J12 as follows:

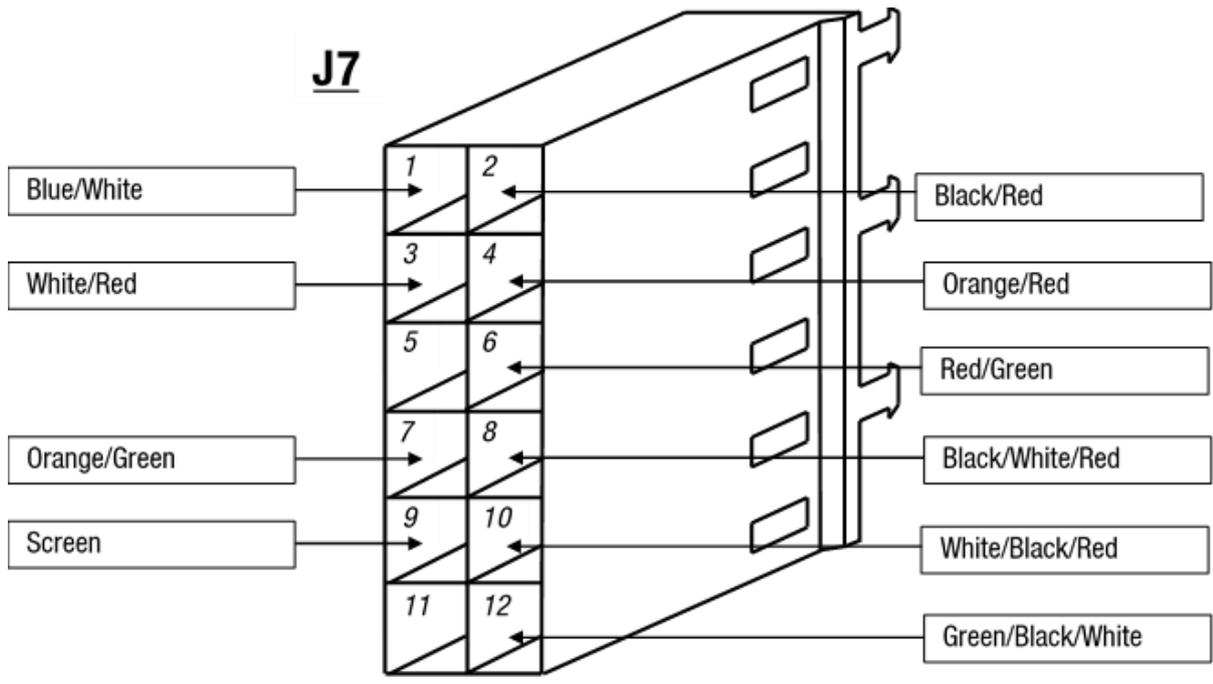
TXDP to RS485A

DTRP to RS485B

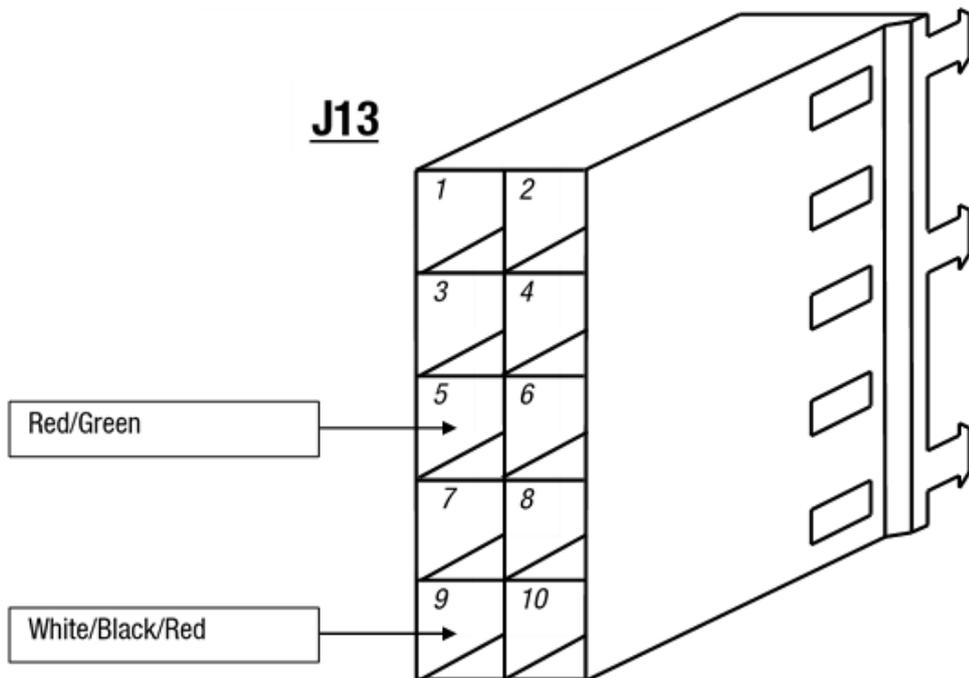
GND to GND

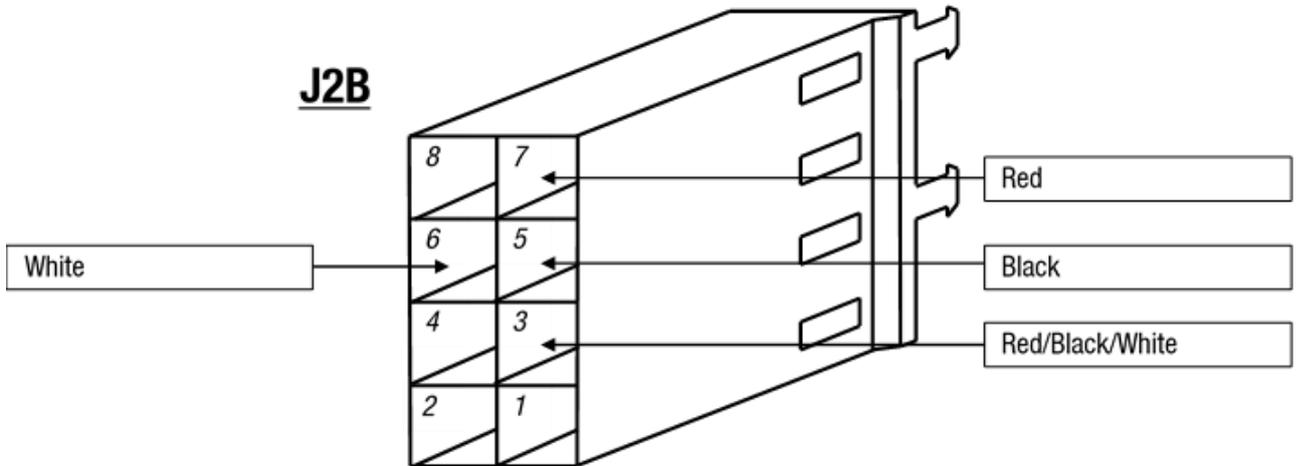
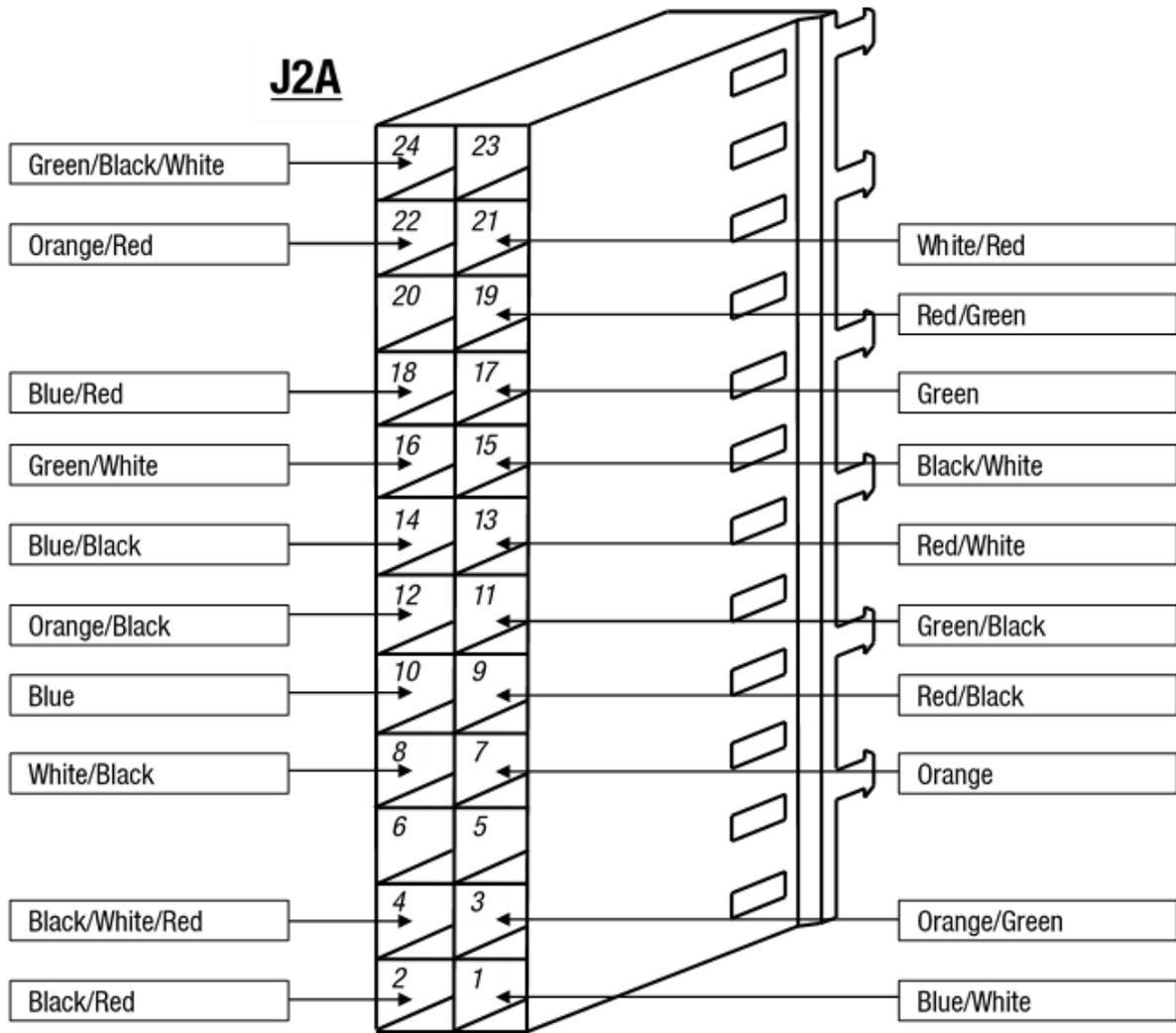
C400 IS Cable for RS485 MOD-BUS





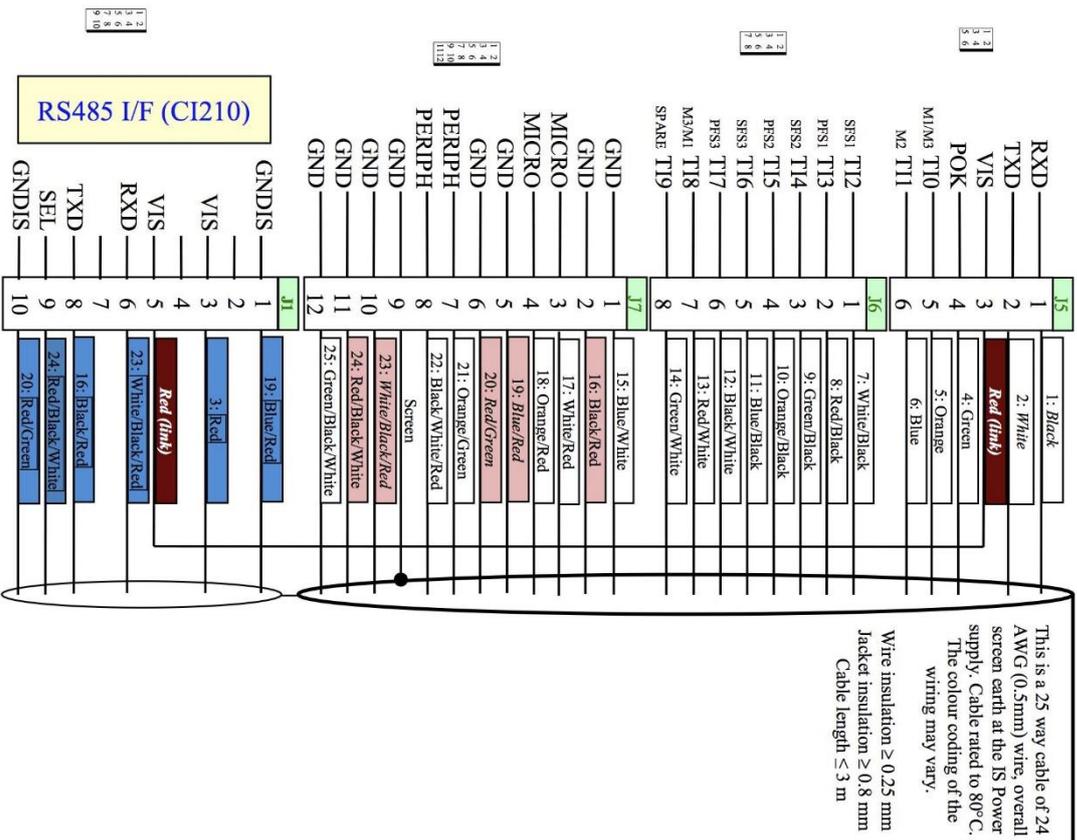
**MICROPROCESSOR END**



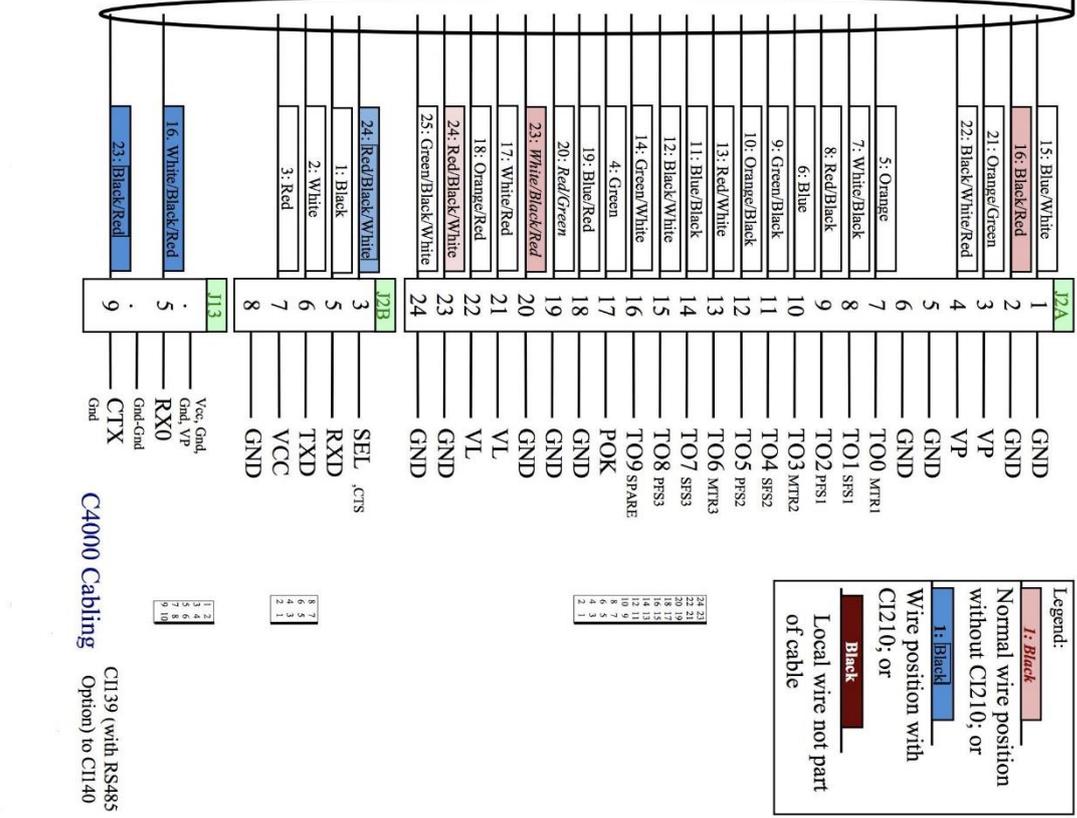


# Electrical Drawing

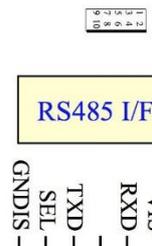
## IS Power Supply (CI139)



## Microprocessor PCB (CI140)



## C4000 with RS485 MOD-BUS Wiring



### RS485 Forecourt Wiring

The following changes are made to standard Compac C4000 wiring to allow the use of RS485 communication with other devices.

#### C4000 Power Supply:

An RS485 Board is fitted inside the Power supply flame proof box.

Connect the RS485 cable to the terminals on J12 as follows:

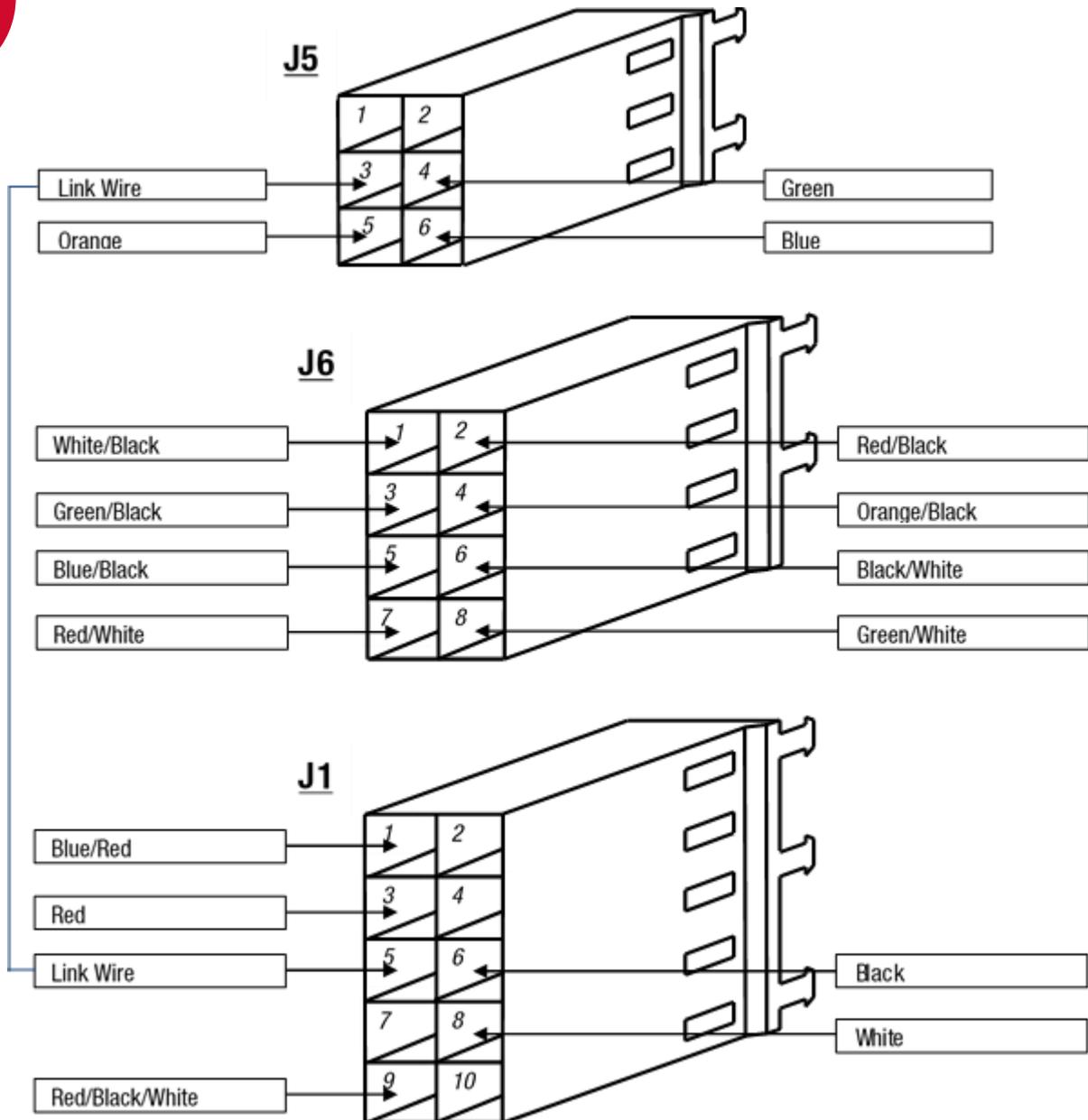
TXDP to RS485A

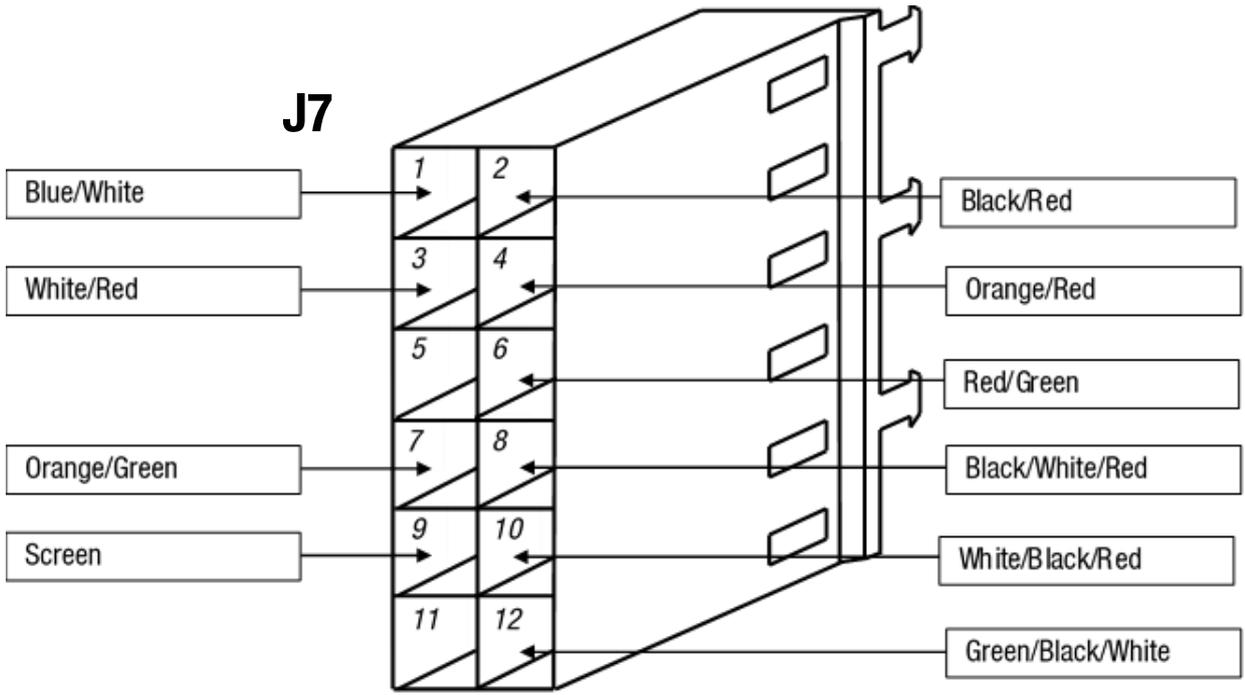
DTRP to RS485B

GND to GND

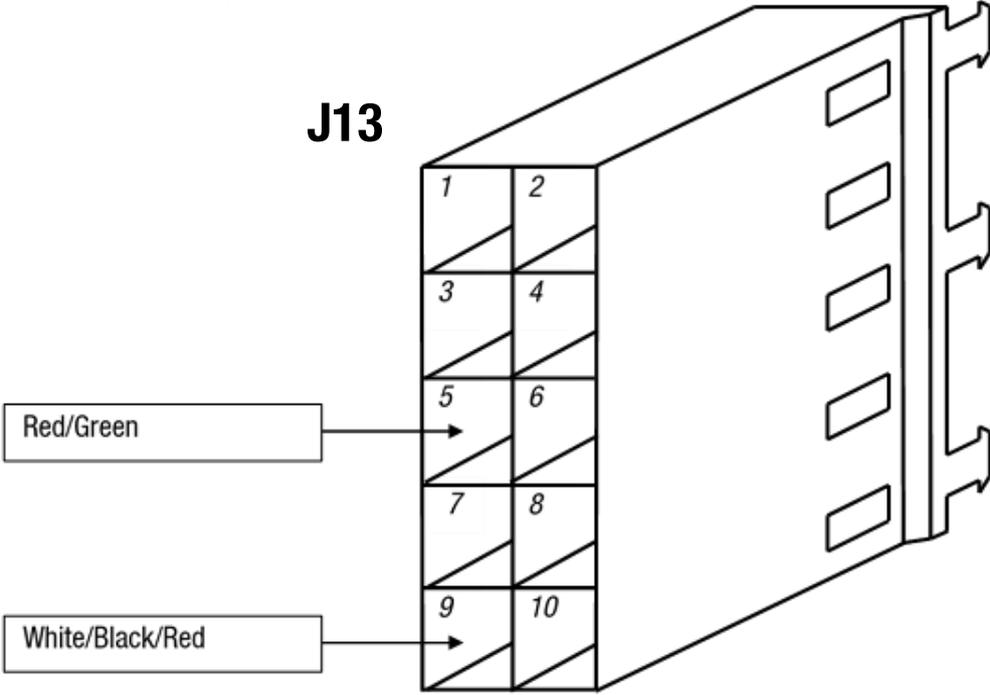
#### C4000 IS Cable for RS485 Forecourt:

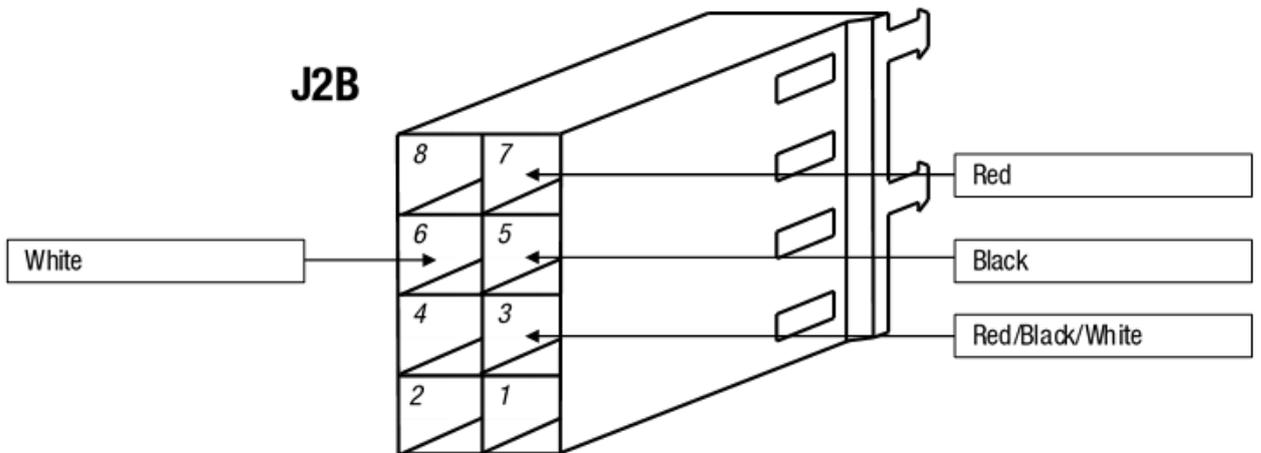
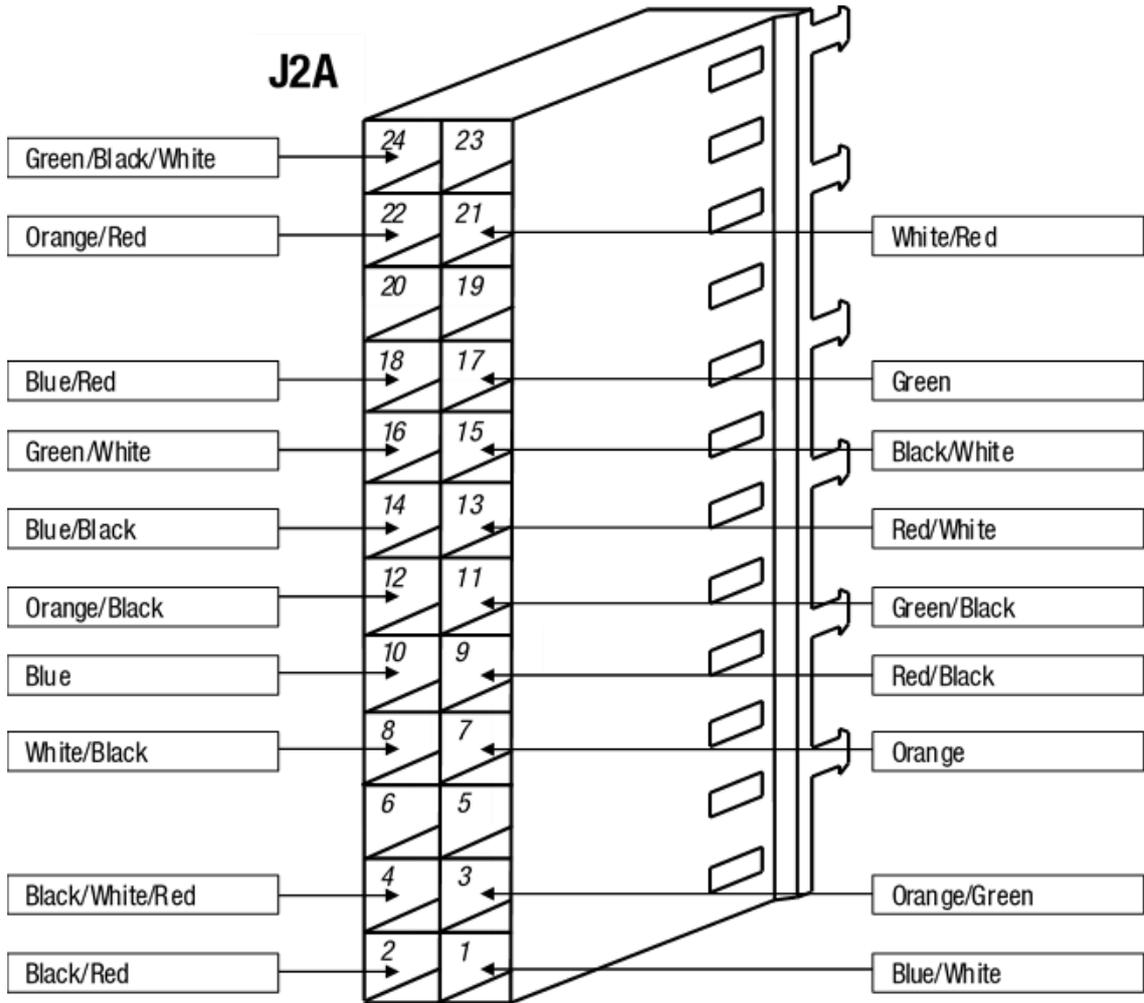
The IS cable pinouts will need to be changed to match the wiring detailed below.





**MICROPROCESSOR END**





## RS485 Wiring

Connecting RS485 equipped dispensers to controller:

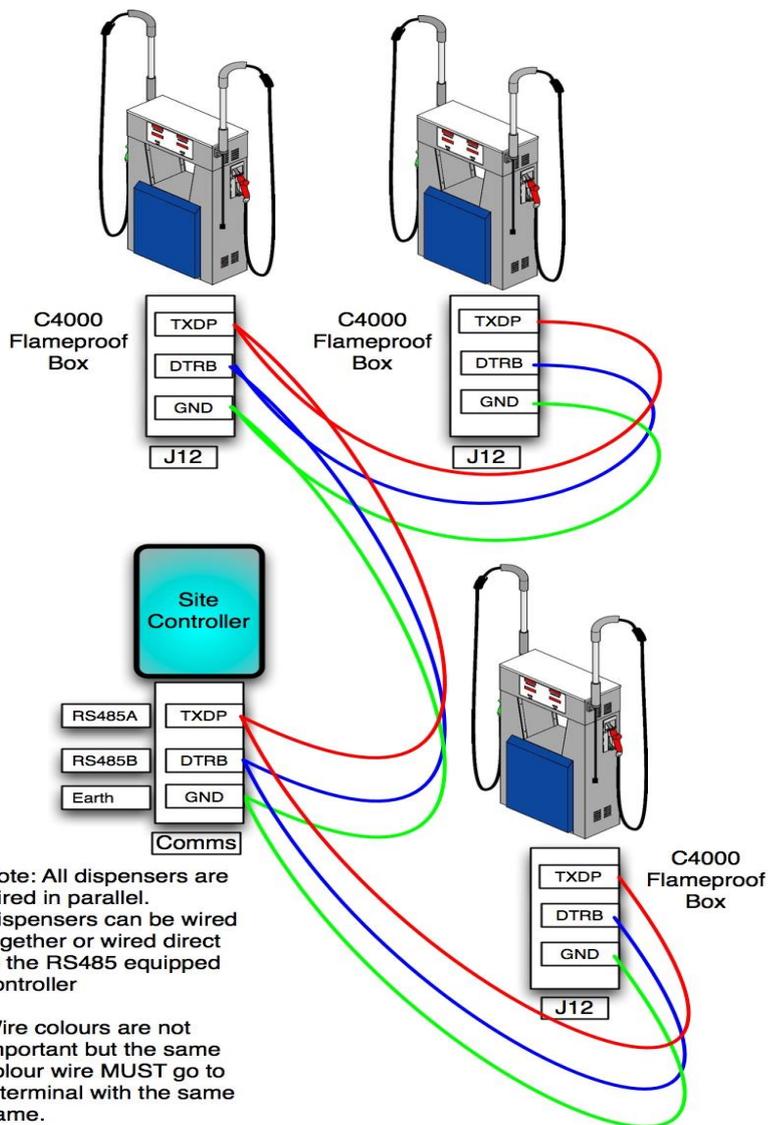
Wiring typically uses 3 cores of a 4 core SWA two twisted pair cable connected to the terminals on J12 named TXDP, DTRB and GND inside the C4000 box. If connecting multiple dispensers, always wire them in parallel.

At the site controller, the terminals may be named:

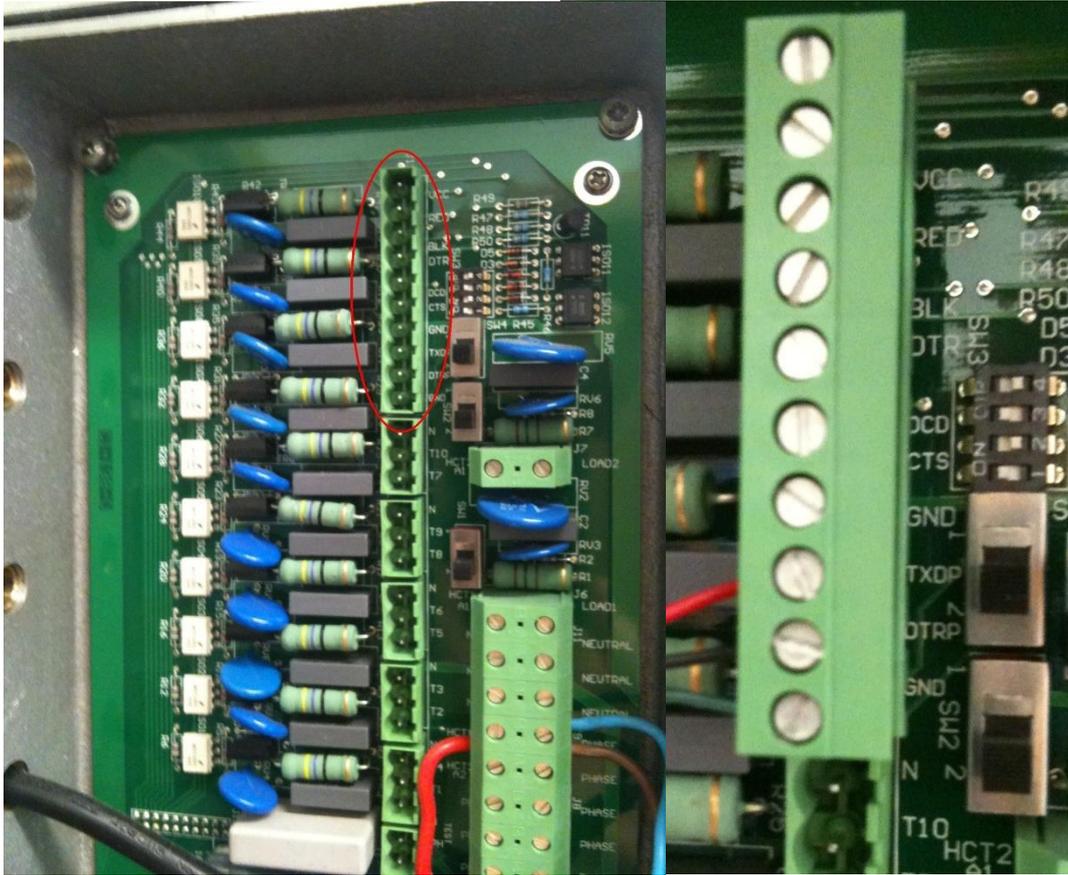
*RS485A = TXDP, RS485B = DTRB, GND = Ground or Earth*

**DANGER:** The C4000 box contains mains voltage power. Always isolate before removing the lid.

RS485 communications wiring



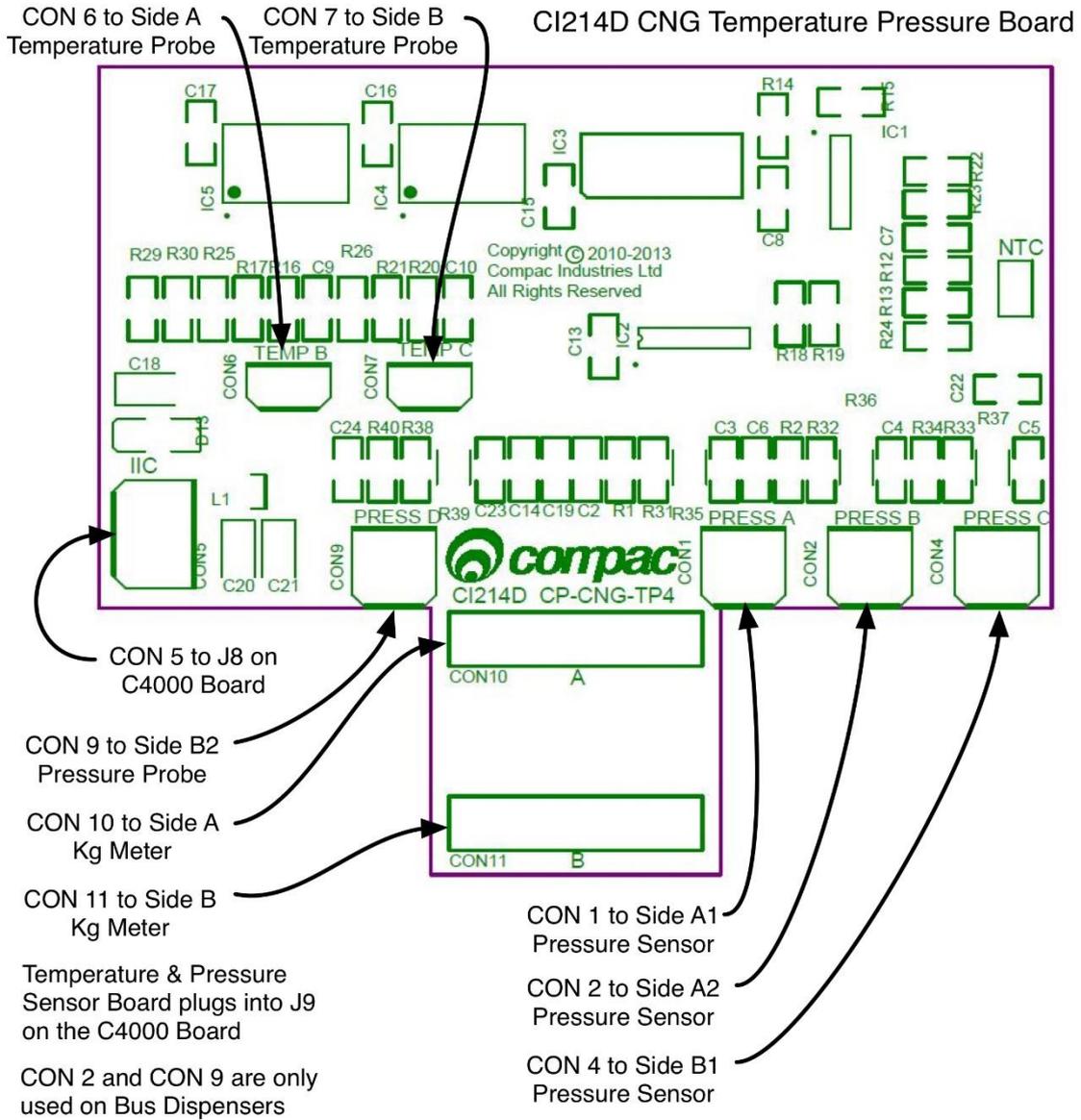
## J12 Connections



**CAUTION:** All wiring entering the C4000 flameproof box must be glanded in accordance with your local regulations. Take all precautions to ensure water or moisture does not enter the box and that the box is properly sealed when finished.



## C4000 Temperature Pressure Interface Board CI214D

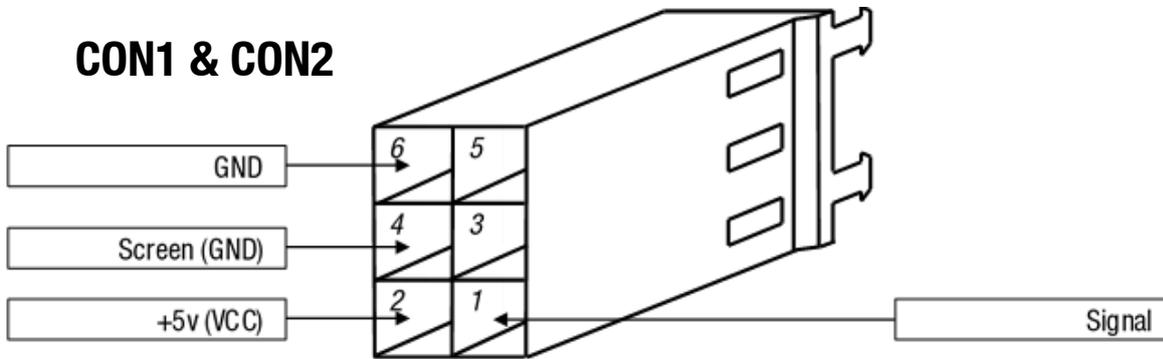


### Temperature Pressure Interface Board Pin Connections:

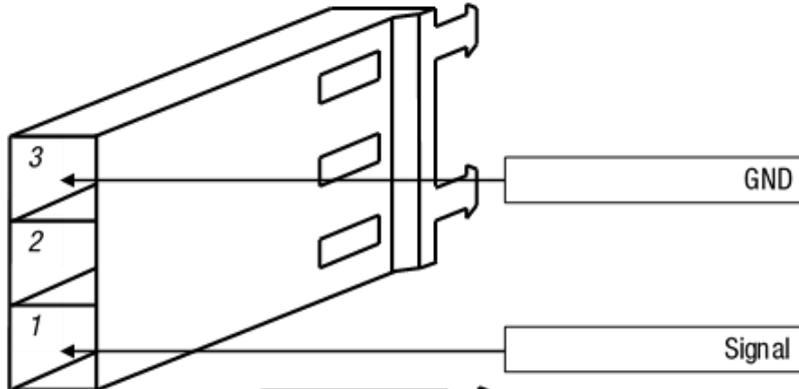
Connection	Function
CON 1	Pressure Transducer Side A1
CON 2	Pressure Transducer A2 (Bus dispensers)
CON 4	Pressure Transducer B1
CON 6	Temperature Probe Side A

CON 7	Temperature Probe Side B
CON 9	Pressure Transducer B2 (Bus dispensers)
CON 5	Connection to J8 on C4000 board Board plugs into J9 on C4000 board

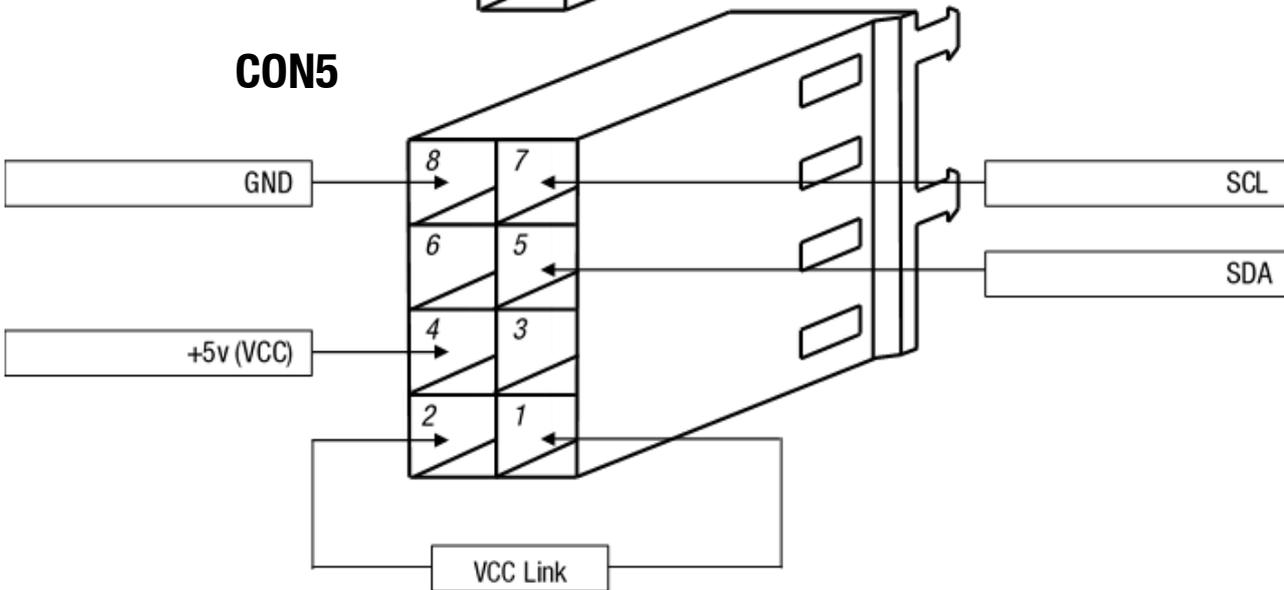
### CON1 & CON2



### CON3 & CON4



### CON5



### C4000 IS Cable Connections

The IS cable connects the power supply board to the C4000 Microprocessor.

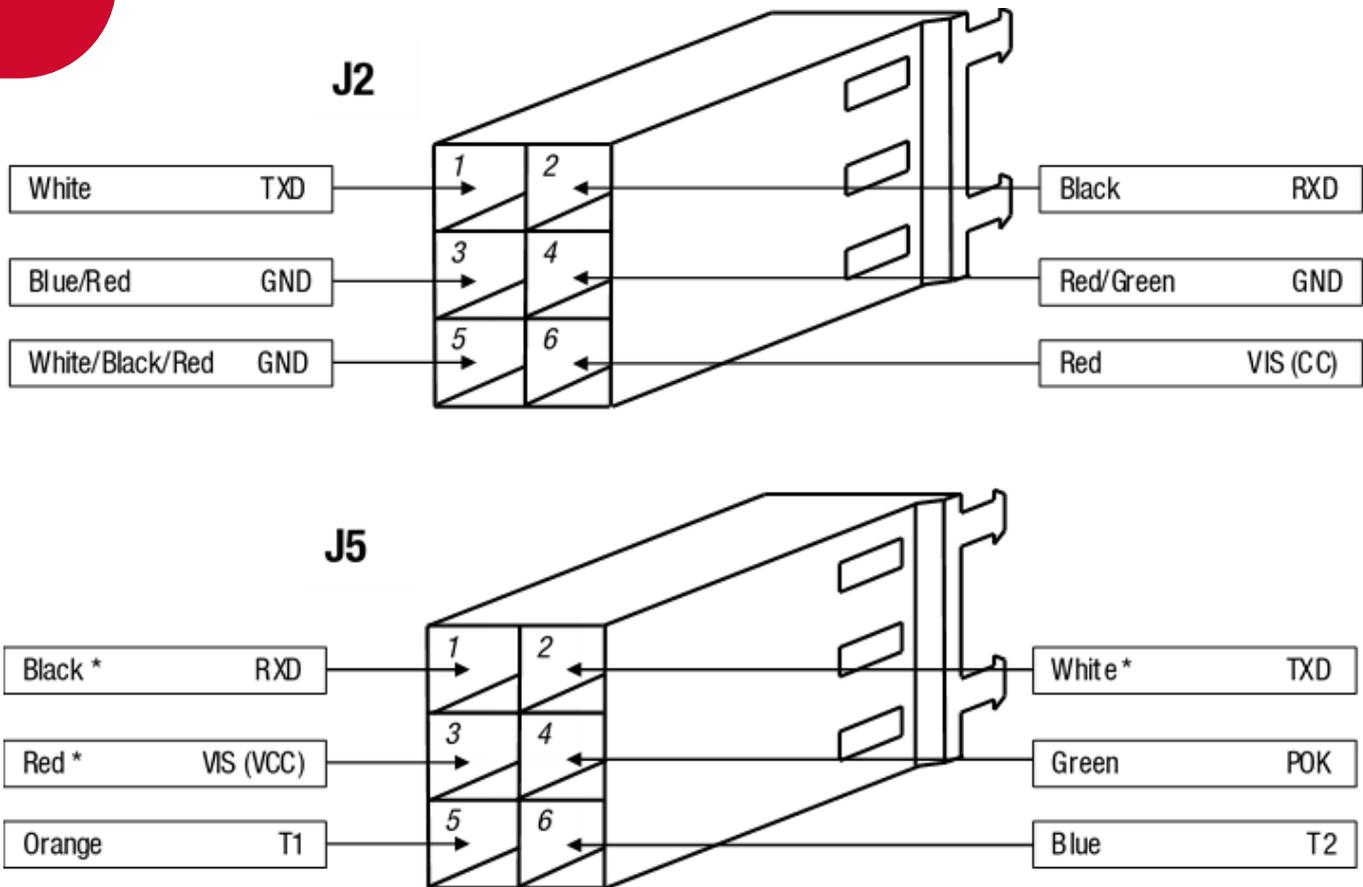
The ends of the C4000 IS cable are denoted as follows:

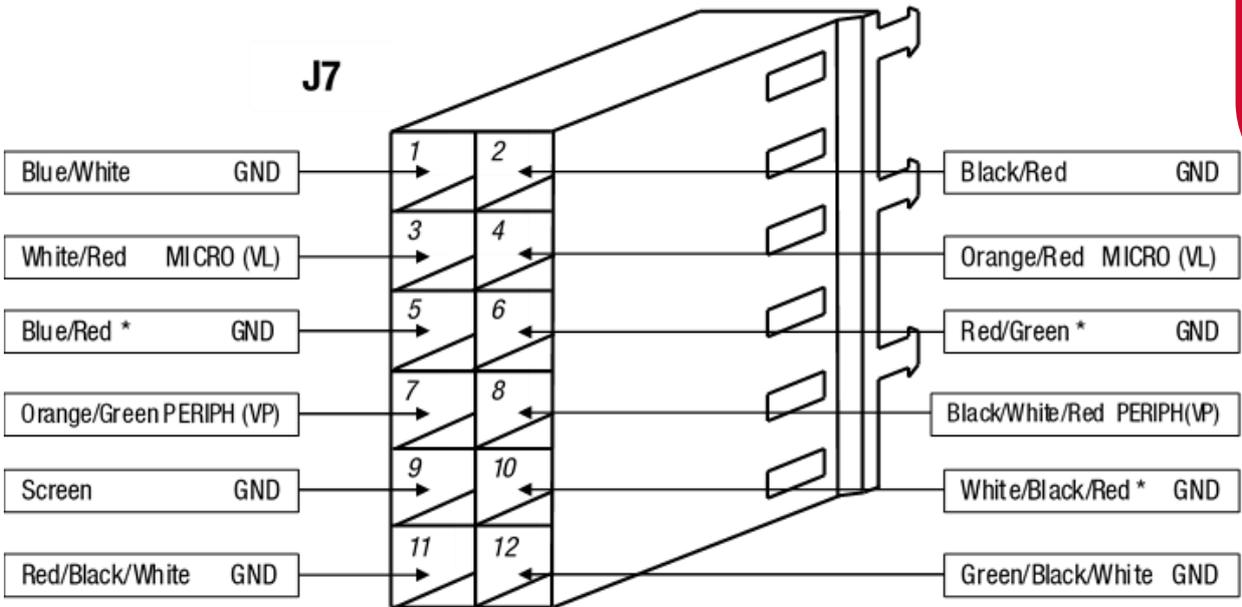
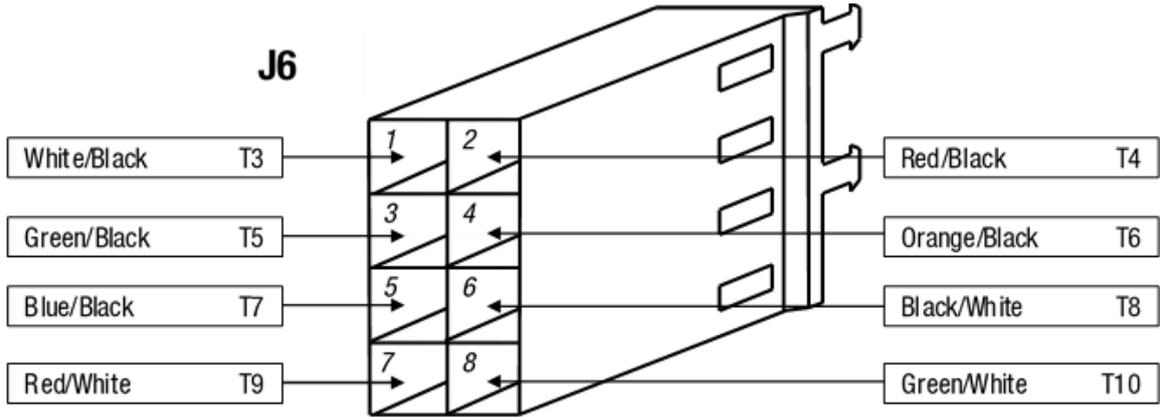
- **C4000 IS cable:** Power supply end.
- **C4000 IS cable:** Microprocessor end.
- **C4000 IS cable:** Gilbarco interface option.

The diagrams below illustrate the power supply end of the C4000 IS cable, and show colour codes and housing.

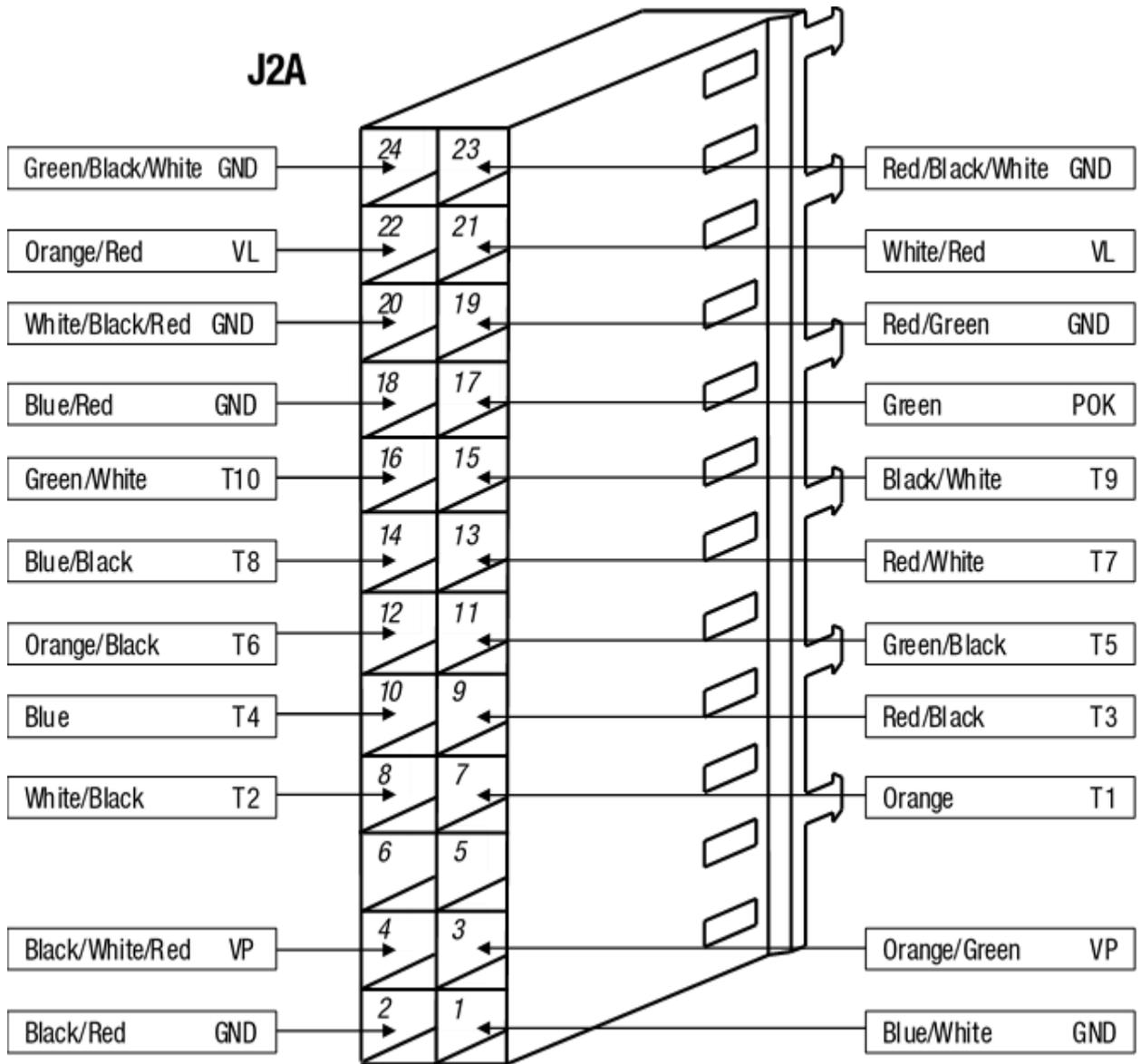
Codes marked with \* are moved to another housing for the Gilbarco interface option.

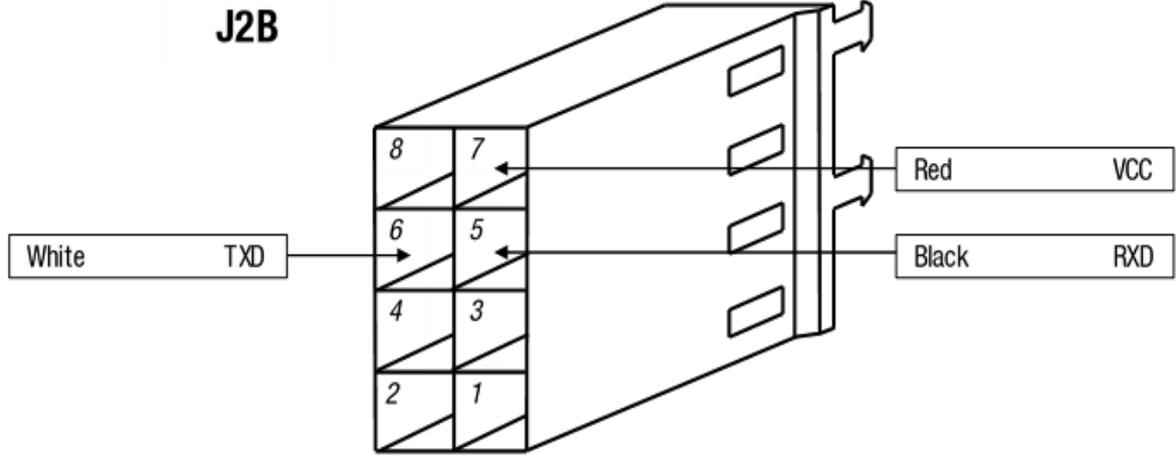
#### C4000 IS Cable - Power Supply End



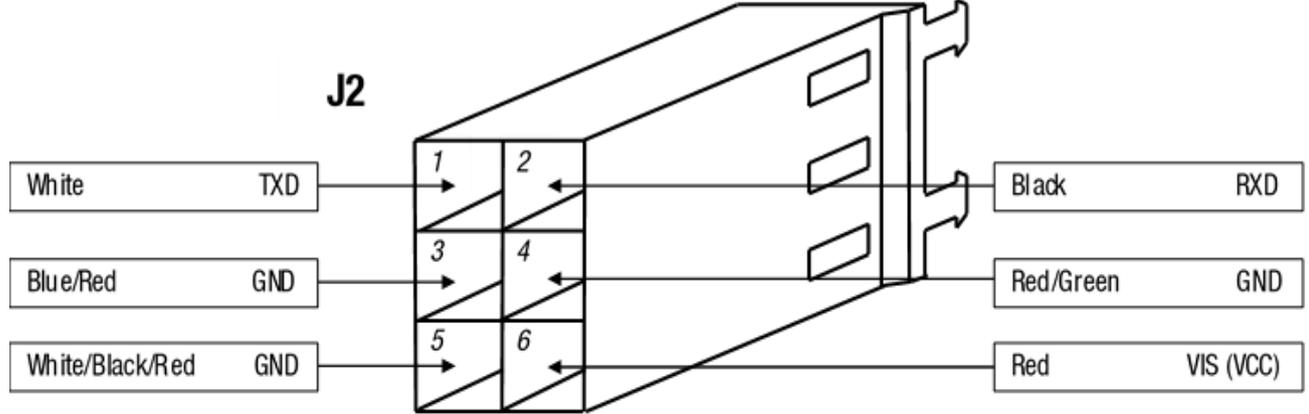


C4000 is Cable Microprocessor End





C400 IS Cable – Gilarco Interface Option



## 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

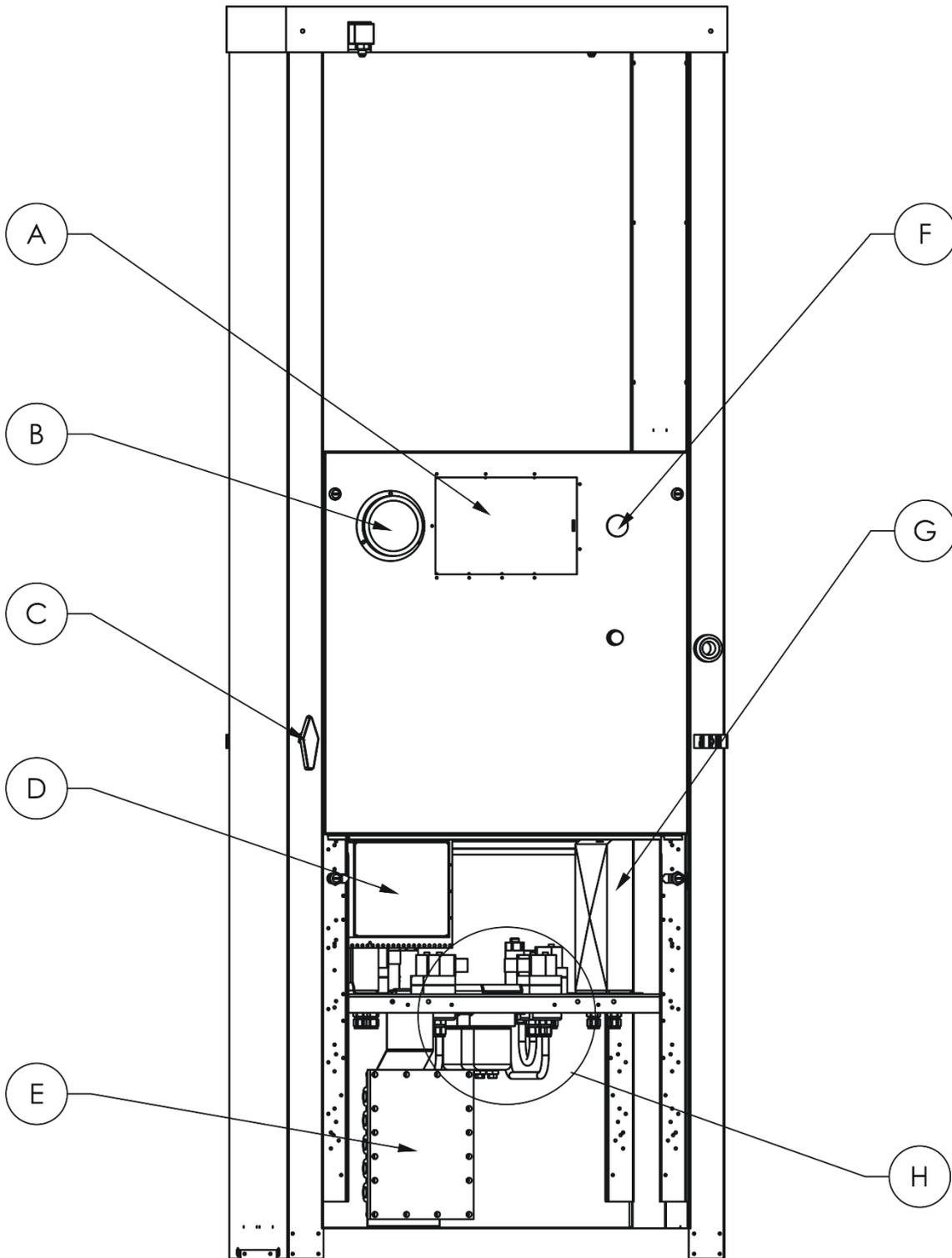
See diagram on the next page for part locations.

Item	Part Number	Description
A	F-CP-DSPLAY-GD1H	GD1 Display With One Unit Price LCD (C1170)
	F-CP-DSPLAY-GD2H	GD1 Display With Two Unit Price LCDs (C1170)
	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
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

Item	Part Number	Description
	<b>FC-B8-HDLRED</b>	Isolating Valve Handle (Red), Parker 2 Way 8 Series
	<b>FC-B8-HLDGSCR-SS</b>	Isolating Valve Handle Grub Screw, Parker 2 Way 8 Series
	<b>F-CP-PROCES-A</b>	C4000 Processor Board, No Memory Or Software (CI140)
<b>D</b>	<b>F-AD-DS1225</b>	Dallas Memory Chip
	<b>F-CS-IC-C4DISP</b>	Software Chip (Please Specify Code Version Required When Ordering)
	<b>F-CP-C4PWRASS230</b>	C4000 Power Supply (CI138F/230V +CI139H)
<b>E</b>	<b>F-C4PWR-FKE</b>	C4000 Power Supply Fuse Kit
	<b>F-CP-C4GILB-I/F-K</b>	Gilbarco Interface Board Kit For C4000 Power Supply
	<b>FC-PBSW-ESTOP</b>	Red Stop Button With Mushroom Head
<b>F</b>	<b>FC-PBSW-START</b>	Green Start Button
<b>G</b>	<b>F-D-METER-KG80T</b>	KG80 Mass Flow Meter
<b>H</b>	<b>Compac Hydraulic Module</b>	See Hydraulic Module Spare Parts

**Dispenser Spare Part**

Main Dispenser Parts Location



### Other Dispenser Parts Not Shown in Drawing

Part Number	Description
<b>F-CU-CNG-PR-MSP3</b>	CNG Pressure Sensor, Schaveitz MSP3000
<b>F-CU-CNG-TEMPSEN</b>	CNG Temperature Sensor
<b>F-CP-CNG-TEMP</b>	Pressure / Temperature Interface Board (CI75)
<b>FC-VALVE-0010</b>	Gas operated valve (option) valve assembly without actuator
<b>FC-SK-0029</b>	Gas operated valve (option) service kit

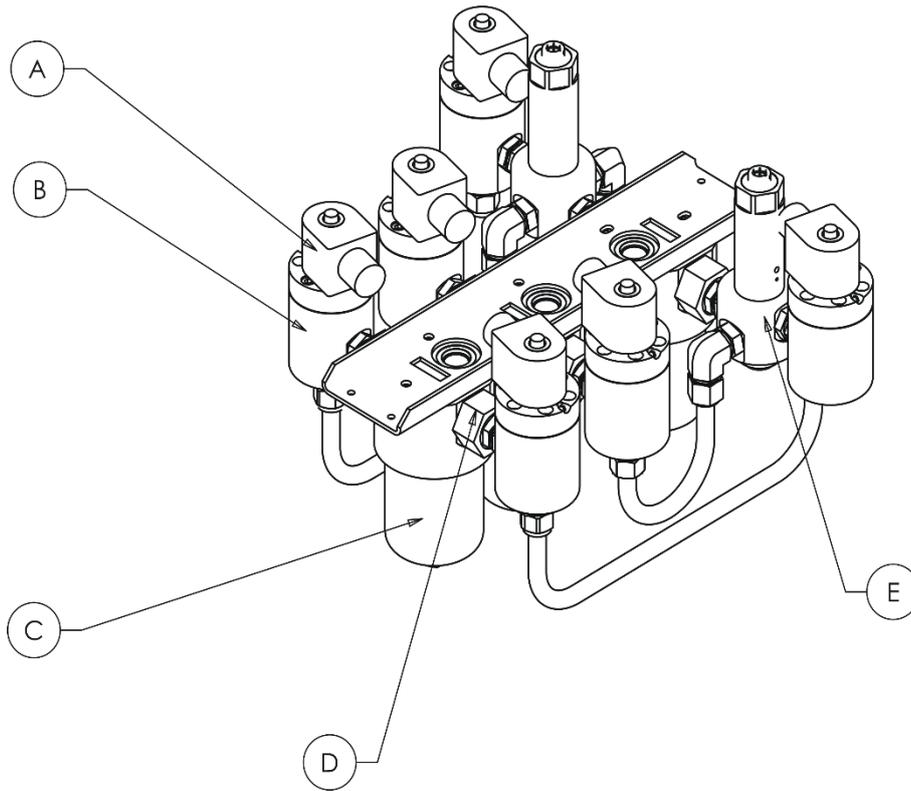
### Nozzles and Breakaways

Part Number	Description
<b>FC-VALVE-0032</b>	Three way valve with stainless steel body with return pipe (replaces FC-VALVE-0005)
<b>FC-VALVE-0033</b>	Three way valve with stainless steel body without return pipe (replaces FC-VALVE-0009)
<b>FC-SK-0048</b>	Seal kit for three way valve with stainless steel body
<b>FC-SVK-0002</b>	Three way valve ball spindle (order with FC-SK-00048 if required)
<b>FC-PROBE-NZ</b>	NZ 7/16" CNG Refuelling Probe With O-rings
<b>FC-NOZL-CT1000S</b>	NGV1 Type 1 CNG Nozzle With Integral 3-Way Valve, OPW / Sherex CT1000
<b>FC-NOZL-CC600</b>	NGV1 Type 2 CNG Nozzle, OPW CC600P30NFS 3000PSI
<b>FC-NOZL-NGV1</b>	NGV1 Type 2 CNG Nozzle, Parker FM301-6FOPC
<b>FC-NOZL-CT5000S</b>	NGV2 CNG Refuelling Nozzle OPW CT5000S (Includes 3/8" Tube To 1/8" NPTF Stainless Steel Fitting For Vent Tube)
<b>FC-BWY-0001</b>	QBCI-09 Compac Inline Quick Breakaway 9/16" SAE Ports (Not For Vent Line Use)
<b>FC-BWY-0003</b>	QBCI-09 Compac Inline Quick Breakaway
<b>FC-SK-0011</b>	QBCI-09 and QBCI-06 Compac Inline Quick Breakaway Seal Kit
<b>FC-OPW-BWY-ILB1</b>	OPW ILB-1 Breakaway

**Dispenser Spare Part**

Part Number	Description
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
	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)

Item	Part Number	Description
B	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

**Dispenser Spare Part**

**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  $-10^{\circ}\text{C}$ , power should only be removed from the dispenser for servicing.

Problem	Likely Cause(s)	Recommended Action
<b>For all problems not listed here please contact your service agent</b>		
After powering the dispenser, <b>PAUSE</b> is displayed on the countdown from 60 does not start.	For push to start dispensers the <b>START</b> button is held down.	Release the <b>START</b> button.
	The nozzle is not stowed, or the nozzle switch is active.	Correctly stow the nozzle.
The C4000 electronics are not working. The indicator LEDs are off and nothing happens when you lift the nozzle (i.e., no beeps or <b>888888s</b> are displayed).	Unacceptable voltage spikes are causing the fuses on the C4000 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 <b>START</b> button is pressed the dispenser does not display the <b>88888s</b> and reset for the next fill.	The dispenser number has not been set.	Set the dispenser number.
	The <b>START</b> button or <b>nozzle</b> switch is faulty, stuck, or broken.	Check that the <b>nozzle</b> 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.

Problem	Likely Cause(s)	Recommended Action
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.
The preset display is flashing after a fill.	The preset amount has been exceeded. <b>NOTE:</b> 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 C4000 needs to be reset.	Re-power dispenser. If problem continues contact your service agent
The dispenser stops at 9999.99, 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.
<b>NOTE:</b> When fixing a Compac CNG 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.

Recent versions of CNG software will flash the end of sale indicator in the price per litre window at the end of each fill during normal operation. Older versions of software will need to use the procedure below to view the end of sale indicator.

To View the End of Sale indicators:

- Press and release the **Parameter** switch until the required hose number (**Pn**, **PnA** or **Pnb**) 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. <b>Normal end of sale message for temperature compensated and Fast Fill dispensers.</b>	
3	Fill timed out. <b>Start</b> button pressed, or nozzle lifted, without flow.	<p>Check inlet gas pressure.</p> <p>Check solenoid operation. Refer Solenoid Problems</p> <p>Check nozzle and breakaway for blockages.</p>
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	

Number	Meaning	Checks
	setting. <b>Normal end of sale message for regulator controlled dispensers</b>	
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 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	<b>STOP</b> switch operated.	Check the stop switch wiring and switch operation. Refer CNG 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 <b>hold</b> . (No fuel will be dispensed).	

**End of Sale Indicators**

## 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.

You can clear all fault codes by quickly pressing the **start** button or **nozzle** switch five times. This also displays the tote information, which remains on the screen for 10 seconds for each section of tote data.

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

**NOTE:** When fixing Compac CNG 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 C4000 head.	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 C4000 head.	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

Error Code	Likely Cause	Recommended Action
Err 13	The temperature pressure interface board is disconnected or has failed.	Contact your service agent
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
PA:USE	The dispenser is in start-up mode.	Hang up the nozzle. The PA:USE message stays on the display for 60 seconds, then changes to 000. When the display changes to 000, the dispenser is ready to dispense gas.
STOP	The STOP switch is latched on.	Establish why the STOP switch was operated. If safe, reset the switch by rotating the button clockwise.
PrSErr	There is a pressure difference of 10 bar or more between the pressure probes.	Contact your service agent
PrESEr	Preset amount is less than 2litres.	Set up a valid preset amount.
PrLo	POS is sending a preset amount below the minimum required by the dispenser	Send a preset amount greater than the minimum requirement.
:00	The dispenser's power supply has been turned off and back on since the last transaction.	The colon disappears when the nozzle is lifted for the next transaction.
Ab d PE d PE P PS d PS P	The display has an error	Check for moisture or humid environment Contact your service agent