



CNG Loading Post Installation and Service Manual

Version 1.0.0



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Product Identification

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|---------------------|---|
| Manual Title | CNG Loading post Installation and Service Manual |
|---------------------|---|

| | |
|-------------------------|------------|
| Publication Date | 05/05/2014 |
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| Models Covered | |
| | CNG Loading post |

| | | |
|--------------------|------------------------|---|
| Application | Compressed Natural Gas | 275 or 350 bar Max |
| | Power Supply | 220 - 240 VAC 50 Hz 2 Amp +/- 10% |
| | Air Supply Pressure | 5 to 10 bar (Only required for units with air actuated valves) |

| Related Manuals | Title | Publication Date |
|------------------------|--------------|-------------------------|
| | | |

| | |
|-----------------|---|
| Validity | Compac Industries Limited reserves the right to revise or change product specifications at any time. This publication describes the state of the CNG Loading post at the time of publication and may not reflect the product at all times in the past or in the future. |
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|-------------------------------------|---|
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Symbols and Units of Measure

Symbols

Symbols are used in this manual to highlight information that is critical to the safety of people and equipment, and for the safe and correct operation of the Compac equipment

⚠ DANGER *An extreme hazard that may result in death or injury if proper precautions are not taken.*

⚠ DANGER *A reminder of safety practices or unsafe practices that could result in personal injury or damage to associated equipment.*

⚠ CAUTION *A reminder of safety practices or unsafe practices that could result in damage to associated equipment and/or voids the warranty.*

⚠ NOTE *Important information essential to the installation and operation of the Compac equipment*

Units of Measure

The following units of measure are used in this manual:

| Unit | Measure |
|-------------|---|
| Pressure | Bar (bar) |
| Temperature | Degrees Celsius (°C) |
| Volume | Litres (l) Cubic Metres (m ³) |
| Mass | Kilograms (kg) |
| Length | Metres (m) Millimetres (mm) Microns, Micrometres (µm) Inches (") |
| Torque | Newton Metres (Nm) |
| Voltage | Volts (V) |
| Current | Amps (A) |
| Frequency | Frequency (Hz) |

Safety

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 loading post, injury, or death.

Make sure that you read and understand all safety precautions before installing, servicing or operating the Compac equipment.

System Design

⚠ DANGER *Ensure the system design does not allow the inlet pressure to exceed its rating. The unit does not include any safety features to protect against excessive inlet pressure. If necessary, suitable protective devices should be fitted before the inlet.*

Mechanical Safety

Observe the following electrical precautions:

⚠ DANGER *Never tighten a fitting under pressure, even if a fitting or joint is leaking. Always depressurise the line first*

⚠ DANGER *Never disassemble a fitting under pressure. Always depressurise the line first*

⚠ DANGER *Be very careful when disassembling frozen pipework, as gas pressure may be trapped and suddenly released. Always depressurise the lines first.*

⚠ CAUTION *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*

⚠ CAUTION *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*

⚠ CAUTION *Make sure the service area is thoroughly cleaned before starting to service CNG components. Dust and dirt entering components reduce the life span of the components and can affect operation*

Electrical Safety

Observe the following electrical precautions:

⚠ DANGER *Always turn off the power to the CNG unit before removing the box lid. Never touch wiring or components inside the CNG Loading post with the power on.*

⚠ DANGER *Never power up the CNG unit with the flameproof box lid removed.*

⚠ CAUTION *Always turn off the power to the unit before removing or replacing software or memory IC's*

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

Introduction

The Compac CNC loading post is designed to provide safe and reliable metered filling of CNG tanks from a supply tank.

Compac CNG loading posts are controlled by a C4000 board and use the reliable Compac KG80 flow meter.

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

The manual may refer to loading posts. Unless otherwise noted, this refers to the loading post.

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

Mechanical Installation

Overview

The stages of mechanical installation include:

- Preparing and cleaning the pipework (see page 11).
- Mounting the loading post.
- Connecting the pipework (see page 13).

Special Precautions

⚠ CAUTION *Ensure the system design does not allow the loading post inlet pressure to exceed its rating. The loading post does not include any safety mechanisms to protect against excessive inlet pressure. If necessary, suitable protective devices should be fitted prior to the loading post inlet.*

⚠ NOTE *Take all possible steps to prevent water or dirt from entering the system, both during installation and in the future. Water and dirt blocks up the pipework, which can damage seals, and stop gas from flowing and valves from operating.*

⚠ NOTE *At 200 bar of pressure, water freezes at 15°C in natural gas, causing ice particle contamination.*

⚠ NOTE *Seals that have been damaged by moisture, methanol, impurities, dirt slag etc, are not covered by warranty.*

During installation, potential sources of water include:

- Inlet gas.
- Testing new inlet gas pipework with water, or allowing water to enter the pipework before making the final connections.
- Pumping the storage with air.
- Allowing water to enter the high-pressure gas lines during installation.

If the inlet gas is likely to be saturated, install a gas drier into the compressor inlet to ensure a dew point of -32°C at 250 bar of pressure.

⚠ CAUTION *Do not use methanol as an anti-freeze. If used in the wrong concentrations, it causes freezing. It is also absorbs water, which can be more damaging than the water that was originally present.*

Pipework

Check the high points and low points of the pipework distribution system to make sure that:

- Vents have been provided on all high points.
- Drains have been provided on all low points.

Preparing and Cleaning Pipework

This section provides a guide to current best practice in preparing the distribution pipework that will be connected to the Compac Loading post.

For new stations, flush the gas feed lines thoroughly to remove all welding slag, moisture, and impurities that may be present in the system.

Any steel, brass, or other impurities can damage the regulator and solenoid valve seals.

NOTE *The pipework installer is responsible for installing all pipework to the post with care. Compac is not responsible for any pipework external to the loading post.*

CAUTION *Ensure that all pipework is completely clean. Any dirt trapped in the pipework can damage the valve seals and surfaces.*

Clean and Degrease the Pipework

To clean and degrease the pipework:

To prepare pipework, purge the pipework with nitrogen at 200 bar vented to the atmosphere to remove dirt, moisture, and water.

1. Mix together a 10% hydrochloric acid solution, to which you have added 25% to 50% ammonia bi-fluoride and heat to a minimum of 65°C.

DANGER *Wear adequate safety gear and take adequate precautions when using chemicals. Clean up all spills in compliance with the local territory authority laws and regulations.*

2. Circulate the mixture through the pipework for four hours or more, depending on the condition of the pipework.
3. Drain the acid solution from the pipework.
4. Blow out the pipework with compressed air.
5. Flush the pipework with clean water until the pH value is neutral.

Neutralise the Pipework

To neutralise the pipework:

1. Pass a 25% citric acid solution through the pipework once, or dry out the pipework by blowing hot air through it.

DANGER *Wear adequate safety gear and take adequate precautions when using chemicals. Clean up all spills in compliance with the local territory authority laws and regulations.*

2. Fill the pipework with seal oil, then drain.
3. Blow out the pipework with compressed air.
4. Blast the pipes with nitrogen at 200 bar, letting the gas expand through the pipes.
5. Once the pipework is cleaned, seal off the system to ensure no water, dirt or other contaminants can re-enter the pipework.

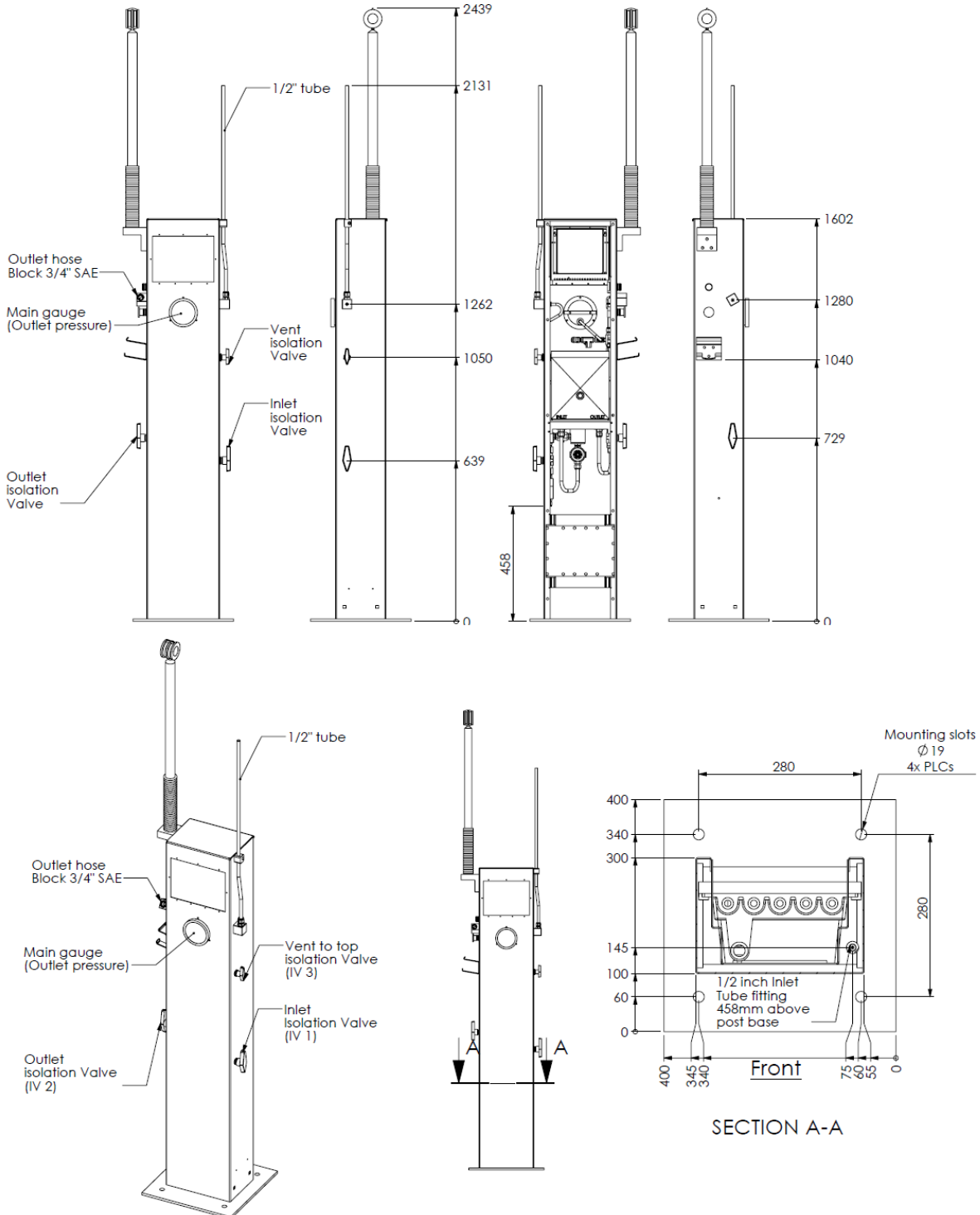
NOTE *Keep the pipework venting open to the atmosphere and feed in the 200 bar of nitrogen to achieve maximum velocity.*

CAUTION *Take care to keep pipe openings closed until the compressor is started. This prevents rusting of the pipework, and stops dirt from entering.*

Mounting the Loading post

To mount the loading post:

1. Make sure that the post is located on a solid, horizontal foundation or plinth.
2. Seal the pipes to prevent dirt, moisture, or water from entering during the mounting process.
3. Mark out the mounting points on the foundation, using the correct footprint diagram for the model of loading post being installed.
4. Secure the loading post with 12 mm dynabolts and washers. 12 mm dynabolts have the required strength to hold the unit but up to 16 mm dynabolts can be used in the 19 mm footprint holes.



Connecting the Pipework

1. Make sure that your work area (including the vice, workbench, tool storage area, and floor) is totally clean of particles or previous work. Cleanliness and correct assembly practice can avoid most seal problems.
2. Make sure that the gas outlet pipes are properly supported before connection.

Electrical Installation

CNG Cable Requirements

Cable requirements are as follows:

| | Cable Type | Requirement |
|-------------------|--------------------------------|---|
| Power | 3 Core Steel Wire Armour Cable | 2.5mm ² , 220 - 240 Volts. 50 Hz, +/-10% Core 1: 230 Volt Supply (Active). Core 2: Neutral. Core 3: Earth. |
| Power Consumption | | 25w Idle, 200W with all solenoids active. |

NOTE *Make sure that there is at least a two metre cable tail on both the incoming underground 230 V cables to reach the C4000 flameproof box.*

Connecting Mains Power

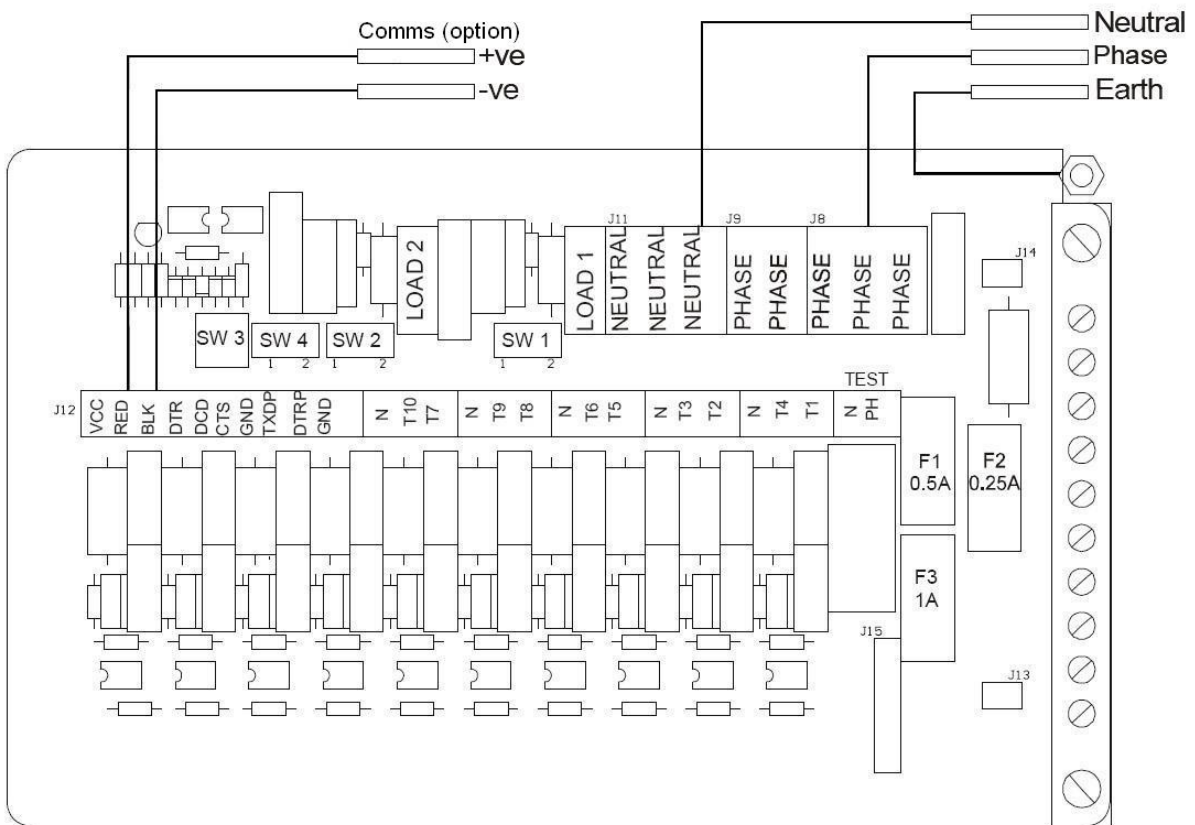
CAUTION In sites where the electrical supply is unstable, it is recommended that a power conditioner or UPS is installed.

To connect the loading post:

1. Wire the power to the C4000 Termination Board, as shown in the diagram below. (Comms option is not available)
2. Connect the earth lead of the supply cable to the earth stud in the flameproof junction box.

NOTE All cables must be terminated with approved flameproof glands. The thread is 20 mm.

Typical wiring



Electrical Commissioning

This procedure outlines how to perform an electrical operational test before carrying out full mechanical commissioning, making sure that the loading post 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 loading post inlets. The factory set-up information should be programmed into the loading post 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 loading post, but they are not part of the loading post).

2. Turn on the power supply to the loading post.

The displays and backlighting will illuminate, and the displays read **PA:uS:E**, then count down for one minute.

The loading post is in a **ready state** once the countdown is finished and the display shows **0.00**.

3. With the loading post in a **ready state**, check that the C4000 Microprocessor Power LED (D1) is turned on
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 to initiate a fill.

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 loading post resets and returns to a **ready state**.

Mechanical Commissioning

At the mechanical commissioning stage, the loading post should not be pressurised.

NOTE *If you find any leaks during commissioning, immediately close all of the valves and de-gas the post (see page 23).*

To perform a mechanical test:

1. Make sure that the outlet shut-off valves are closed. (These are the valves in the lines at the base of the post, but they are not part of the post.)
2. Check all post fittings, especially the outlet 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.*

3. Check that the outlet supply valve is closed and the nozzle valve is closed.
4. Connect the nozzle to a tank containing CNG.
5. Turn on the post and wait for it to power up.

The loading post initially displays **PA:uSE**. When it is ready, **0.00** is displayed.

6. Press the **Start** button.

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

7. Slowly open the inlet shut-off valves and listen for leaks. If you hear leakage, shut off the inlets immediately. If the loading post shuts off during this process, shut off the inlet valves, restart the loading post, and continue.
8. Once the inlet valves are fully open, allow the loading post 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.
9. Press the **Start** button on the loading post.

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

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

11. Repeat steps 8 and 9 for the second hose on a dual hose loading post.
12. Once the outlet isolation valves are fully open, allow the loading post 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 loading post and hose(s) are now fully pressurised.

13. 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.*

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

Set-up

The parameter and K-Factor switches on the C4000 board are used to set up and calibrate the post.

Parameter switch

The loading post is pre-programmed and the parameter switch would not normally be used. Information on this switch can be found on the C4000 manual.

K-Factor Switch

The **K-Factor** switch is located on the C4000 indicator board. You can use this switch to set the density factor (changing the units the display reads in) and the meter calibration.

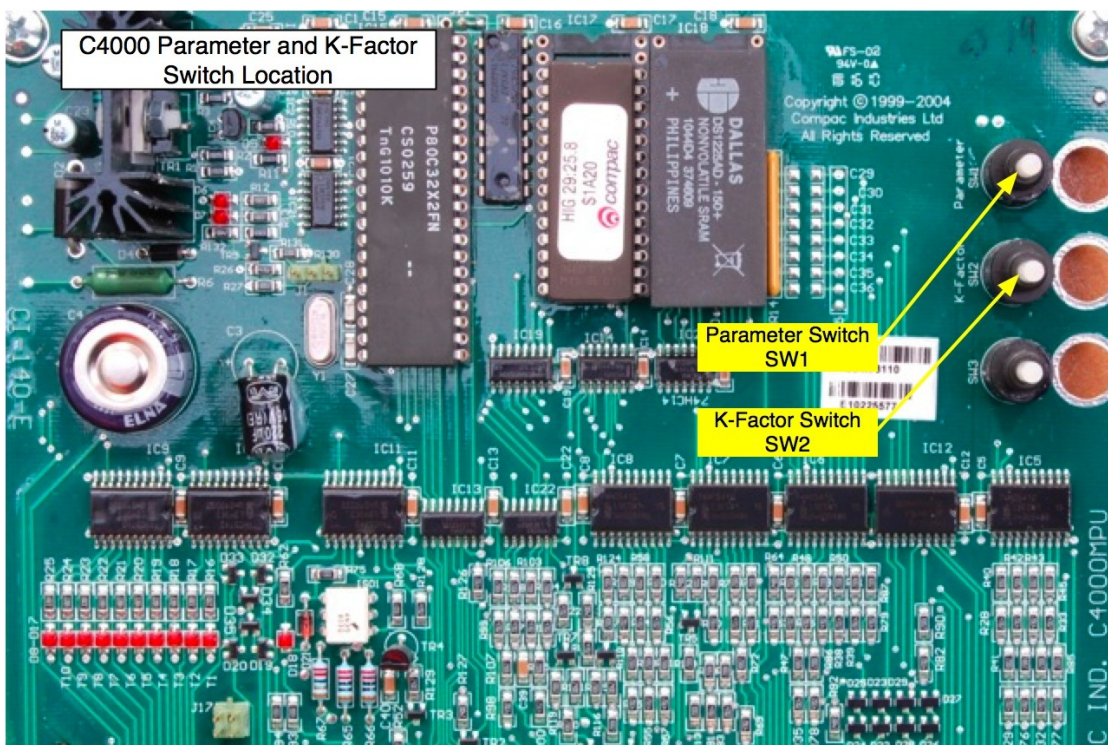


Figure 1: Parameter and K-Factor switches.

Density Factor

The **density factor (dSF)** is used to set the format of the quantity that is displayed. For kilograms, 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 loading post 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 pound = 0.4535 Kg so the density factor is entered as 0.4535. If 1 Kg is now dispensed the display will now read $1 / 0.4535 = 2.205$ pounds.

Adjusting the Density factor

1. Make sure that the loading post is idle.
2. Open the access panel and remove the cover of the C4000 processor box.
3. Press the **K-Factor** switch once and release.

The display shows **dSF x.xxxx**, which is the current density factor setting for the loading post that you are commissioning.

4. 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 (F)** is a meter correction factor used to ensure the displayed quantity is correct.

The K-Factor is set during the calibration phase Meter Calibration (see page 40) and does not require adjusting during service.

To adjust the meter K-Factor

1. Make sure that the loading post is not in use.
2. Press and release the **K-Factor** switch until the required K-factor is shown (**F**)
3. 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 (LFA)** is the low flow cut-off at the end of the fill.

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

1. Make sure that the loading post is idle, with the nozzle in its holster.
2. Press and release the **K-Factor** switch until the required minimum flow rate is displayed. (**LFA**)
3. 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.

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

Maximum Flow Rate

The **maximum flow rate (HFA)** is the high flow cut-off for when the flow through the post is too high.

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

1. Make sure that the post is not in use.
2. Press and release the **K-Factor** switch until the required maximum flow rate is displayed. (**HFA**)
3. 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 or 60 kg/min depending on application.

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

C Configuration Code

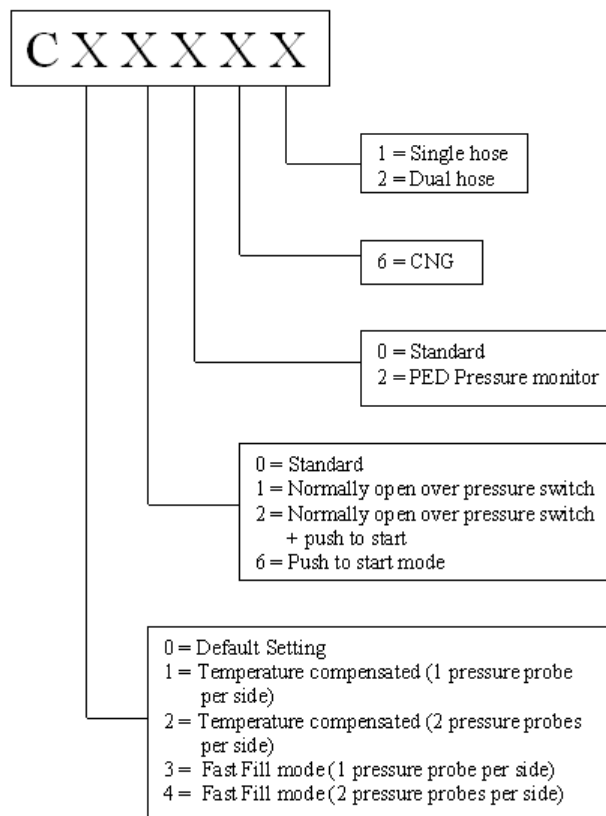
The **C configuration code (C)** changes the operation of the loading post. It is the last setting accessed through the **K-Factor** switch. The configuration code has been factory set and should not be changed. If the memory gets wiped and you need to re-enter it, the configuration is written on the yellow label on the C4000 processor board cover.

To adjust the C Configuration Code

1. Make sure that the post is not in use.
2. Press and release the **K-Factor** switch until **C** is displayed.
3. 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.

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



Reading the Loading Post Totals

To read the loading post totals:

1. Quickly press the **Start** button five times. 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 value (if the meter has been programmed with a value) will be shown on the display for 10 seconds. This will be shown as:

d Followed by a 10 digit Total. If no value has been set, this will show 0.

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. This is the kilograms dispensed (unless another unit measure has been set using the Density Factor switch).

CNG Loading

⚠ DANGER *Wearing appropriate personal safety equipment is recommended while loading CNG. Gloves, safety glasses and/or face shield, hearing protection and non-static generating clothing should be worn. Vehicles should be switched off and any potential sources of ignition removed.*

Refer to hydraulic diagram for the function of the valves. Hydraulic Layout - Loading Post (see page 54).

To use the CNG Loading Post:

1. Check that the inlet valves IV1 (inlet) and IV2 (outlet) are open and vent line valve is closed.
2. Press the Start button. The display will show **888888** and then clear, at this point both the gas and value totals will display **0.00**
3. Connect the refuelling nozzle to the vehicle
4. Open the refuelling nozzle valve to commence filling.
5. The dispenser will emit a long beep signalling the end of the fill, at this point the gas total display flashes **Fin**.
6. 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.*

7. Disconnect the nozzle from the vehicle.
8. Return the refuelling nozzle to the nozzle holder.

Servicing

Degassing the Loading post

When replacing or servicing the hydraulic system, the unit must be degassed. Take appropriate safety precautions when venting gasses.

Degass the Loading post

1. Start with the inlet and outlet valves open, the vent line valve closed and the nozzle not connected to any tank or vehicle.
2. Close the inlet valve(s) on the pipework connecting to the post.
3. Open the vent line valve.
4. When the gas in the lines has vented, press the Start button to open the solenoid valve.
5. When the remaining gas has vented, either wait for the solenoid to time out or press the Stop button.
6. When there is no pressure left in the system, close the inlet, outlet and vent line valves.

Scheduled Servicing

Weekly checks

- Check the sealing and operation of the three-way refuelling valve (see page 26).
- Check the sealing and operation of the solenoids. Refer to: Checking the Sealing of the Solenoid (see page 25)

Suggested 6-monthly service

- Check the post for leaks (see page 25).
- Check hoses for damage and electrical continuity
- Replace breakaway seals
- Replace 3-way refuelling valve seals and inspect ball for scratches and wear. Replace ball if necessary.
- Replace nozzle O-rings. Check that the nozzle is not damaged or bent, replace if necessary
- OEM Nozzles and Breakaways - Refer to manufacturer's instructions

Suggested yearly 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 (see page 27).
- Check the loading post calibration. Meter Calibration (see page 40).
- Check the C4000 Processor Board is clean, dry and dust free.
- Check the C4000 flameproof box lid is bolted down tight and all glands are tight.

Checking the Sealing of the Solenoid

- Connect the loading post to a full tank.
- Close the Outlet valve (IV2)
- Without pressing the start button, degass the lines between the solenoid valve and the outlet valve using the bleed valve (Bv1).
- Close the bleed valve (Bv1) and observe the outlet pressure gauge to see if the pressure rises. If you see a rise in pressure, the solenoid valve is leaking.

Checking the Post for Leaks

Before you start, make sure you have:

- Soapy water

To check the post for leaks:

⚠ CAUTION *Be careful not to spray or drip water into any electronics when checking for leaks.*

1. Make sure the outlet valve is closed.
2. Connect the post to a tank and commence a fill until you see pressure on both the inlet and outlet gauges.
3. Stop the fill
4. Apply soapy water to all joins in the assemblies and fittings on the inside and outside of the loading post, 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 post before disassembling any component or adjusting any fitting. Serious injury may result if components are removed while the post is under pressure.*

5. After checking for leaks, wipe any excess water off the loading post to prevent corrosion.

Checking the Isolation Ball Valve Sealing and Operation

Before you start, make sure you have:

- Soapy water

To check the operation of the isolation ball valve:

1. Close the inlet isolation valve.
2. Open the vent line valve and bleed the gas from the post.
3. Close the bleed valve once the hose is degassed.
4. Press the Start button. The pressure gauge should rise slightly. If it continues to rise, the inlet valve is leaking.
5. 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.
6. To check the outlet valve, pressurise the post then close, the outlet valve then the inlet valve and open the vent line valve. A pressure drop will indicate an outlet valve leak. Go to step 5.
7. To check the vent line valve, pressurise the post and close the inlet valve. A pressure drop will indicate a vent line valve leak. Go to step 5.

Checking the Three Way Refuelling Valve Sealing and 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.

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.

Solenoid Valve Seal Replacement

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)
- Solenoid top service kit - Part number FC-SVK-0001 (optional)

⚠ CAUTION *Never remove or service the stem. If it is leaking, it must be returned to Compac for service.*

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

⚠ NOTE *It is not necessary to remove the solenoid body from the loading post to service the solenoid seals.*

⚠ 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.*

Remove the Old Solenoid Valve Seals

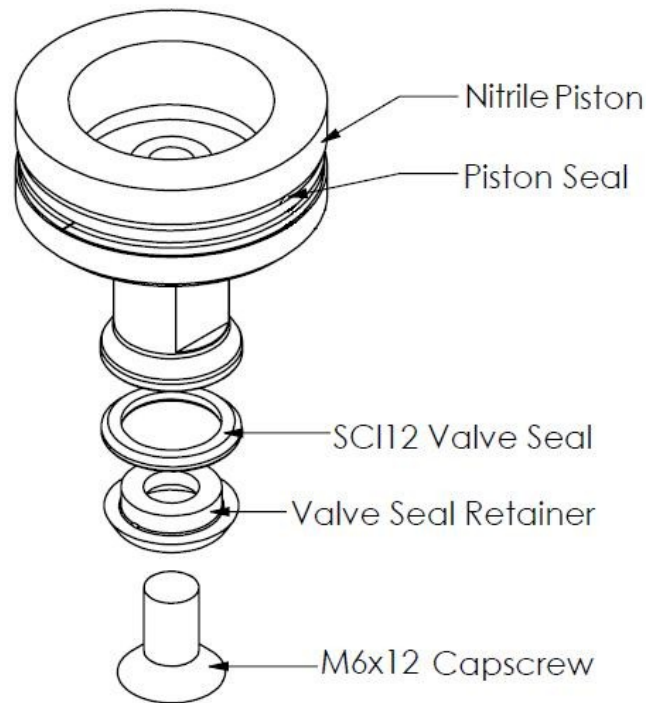
1. De-gas the loading post (see page 23).
2. Switch off the power supply to the loading post.

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

3. Unscrew the solenoid coil retaining nut and move the coil out of the way.
4. Remove the six M6 capscrews 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.*

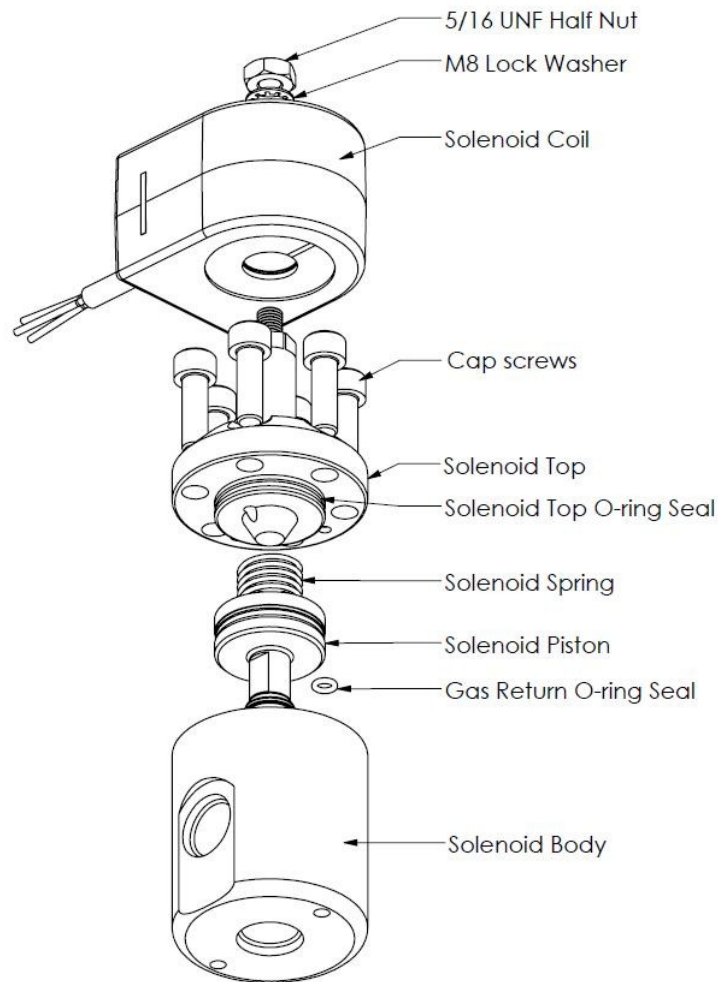
5. Remove the solenoid top and remove the old top O-ring seal and gas return O-ring.
6. Remove the solenoid spring.
7. Screw one of the M6 cap screws into the solenoid piston to withdraw it from the solenoid body.



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

Install new Solenoid Valve Seals

1. Place the new valve seal and seal retainer on the cap screw.
2. Attach a crescent to the flat part on the piston to prevent rotation, and then screw the M6 x 12 mm cap screw into the bottom of the piston, using the seal retainer and valve seal.
3. Insert a new gas return O-ring.
4. Insert the piston back into the solenoid body.
5. Insert the solenoid spring.
6. Insert a new solenoid top O-ring seal.
7. Place the solenoid top back on the solenoid body, making sure that the locating dowel is engaged.
8. Screw in the six M6 cap screws.



Solenoid Coil Replacement

Before you start, make sure you have:

- A replacement solenoid coil **FC-COIL-0001**

Remove the Solenoid Coil

1. De-gas the loading post (see page 23).
2. Switch off the power supply to the loading post.

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

3. Remove the flameproof box lid to gain access to the C4000 power supply board.
4. Disconnect the solenoid coil wiring from the C4000 power supply board.

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

5. 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

Install the New Solenoid Coil

1. 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).*

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 loading post.

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, make sure you have:

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

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.

Replace the Breakaway QBCI-09 Seals

To replace the breakaway seals:

1. 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.*

2. 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.

Reconnect the Breakaway

To reconnect the breakaway:

1. Make sure that both male and female receptacle breakaway parts are clean before reassembly.
2. 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.*

3. 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

Important note

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)

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

1. De-pressurise the unit and remove the valve from the hose assembly.
2. Dis-assemble 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.

3. 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.

Remove the three way valve seals.

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

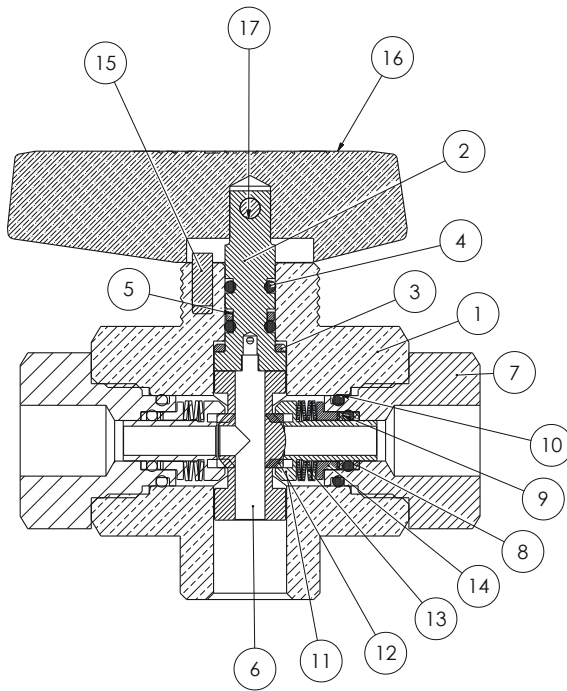
⚠ NOTE Check that the back-up rings are free of burrs and sharp edge.

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

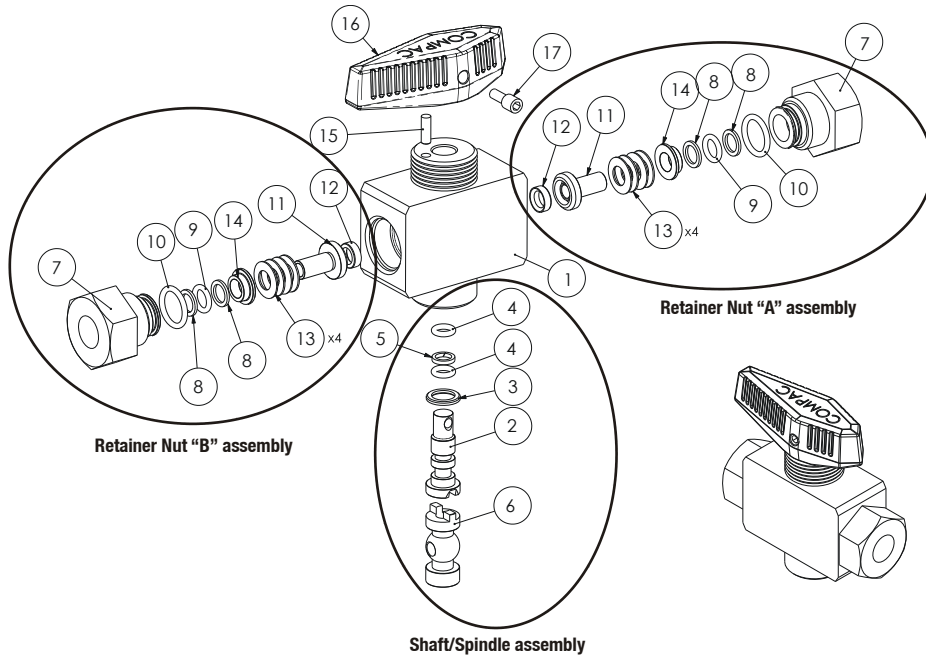
⚠ CAUTION O-rings that are subjected to Natural Gas at high pressure. Swell when exposed to air. Once swollen they must be replaced.

3. Insert the handle shaft into the valve body from the bottom.
4. Insert the ball shaft into the valve body from the bottom.
Note: Ensure that the slotted handle shaft and ball shaft engage.
5. Insert the ball shaft seals in both sides of valve body.
6. Screw the ball shaft retainers into either side of the valve body hand tight.
7. Use a torque wrench to tighten the retainer to 25ft/lb / 34Nm
8. 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 |



Refuelling Hose Replacement

Remove refuelling hose

1. De-gas the post (see page 23).
2. Undo the JIC hose connection at the loading post's outlet block.
3. Undo the connection between the hose and the nozzle assembly

Install new refuelling hose

1. Attach the nozzle assembly to the new hose.
2. When attaching the hose to the three way valve body be careful not to wrench across the valve body as this can tighten the retaining nuts and damage the three way valve seals.
3. Always have a wrench on the retaining nut and tighten the hose into it, ensuring the nut does not turn relative to the valve body.
4. Attach the new hose to the loading post at the outlet block.
5. Check all hose connections for leaks by applying soapy water mixture and looking for bubbles. See page 25.

Power Supply Replacement

Before you start

Obtain the following replacement parts

- Replacement Power Supply part number **F-CP-C4PWR-ASSEM**

Remove the C4000 Power Supply

1. De-gas the loading post (see page 23).
2. Switch off the power supply to the loading post.
⚠ DANGER *Never remove any electrical components without first switching off the power to the loading post. Failure to turn off the power could result in an electric shock.*
3. 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.*
4. Disconnect the incoming power wiring from the phase and neutral terminals, and from the earth bar.
5. Remove all of the solenoid and communications plugs on the top of the C4000 power supply board, with the wiring still intact.
6. Remove the screws that are securing the earth bar, taking care not to lose any of the spacers or other mounting hardware.
7. Remove the two screws on the other end of the C4000 power supply board.
8. 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.

Install the New C4000 Power Supply

1. To install the new C4000 power supply, reverse the procedure above
⚠ DANGER *Before replacing the lid on the flameproof box, make sure that the O-ring is not damaged, and is seated properly in its groove. If the O-ring is damaged and needs replacing, replace it with an O-ring of the same size and specification (176 N70).*

C4000 Processor Board Replacement

Before you start

Obtain the following replacement parts

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

Remove the C4000 Processor board

1. De-gas the loading post (see page 23).
2. Remove the cover of the C4000 enclosure.
3. 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 (see page 17) contains details on obtaining this information.
4. Switch off the power supply to the loading post.
5. Remove both the EPROM and memory chips Loading post Software Upgrade/Replacement (see page 37)

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

6. 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.

Install New C4000 Processor

1. Put the new board in place of the old one, and plug all the wiring back in the same order as before.
2. Refit the EPROM and memory chips, as per Loading Post Software Upgrade/Replacement (see page 37)
3. Check loading post operation (see page 25).

⚠ NOTE It should not be necessary to recalibrate the loading post.

Software Upgrade/Replacement

You can only upgrade the loading post software by replacing the EPROM chip.

⚠ CAUTION *Before working on the loading post electronics, take basic anti-static precautions by wearing a wristband with an earth strap.*

Record Set-up Data and Tote Information

1. Access the C4000 Microprocessor PCB by opening the front panel.
2. Record all the set-up data by accessing the **Parameter** switch (SW1) and the **K-Factor** switch (SW2). Refer to Parameter Switch Settings (see page 17) and K-Factor Switch Settings (see page 17) to obtain this information.

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

- The K-Factor (see page 18).
 - Minimum flow rate (LFA)
 - Maximum flow rate (HFA)
3. Record the totals information by pressing the nozzle switch or start button quickly five times

Remove the software EPROM

1. Turn off the loading post.
2. Remove the software EPROM chip, using an EPROM extractor.

Install new software EPROM

1. 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).
2. Turn on the loading post.
3. Check that the initial set-up data and totals information is the same.
If the initial set-up data is different, re-enter this information, as per Parameter Switch Settings (see page 17) and K-Factor Switch Settings (see page 17).
4. Check the loading post operation Checking Post Operation (see page 25)

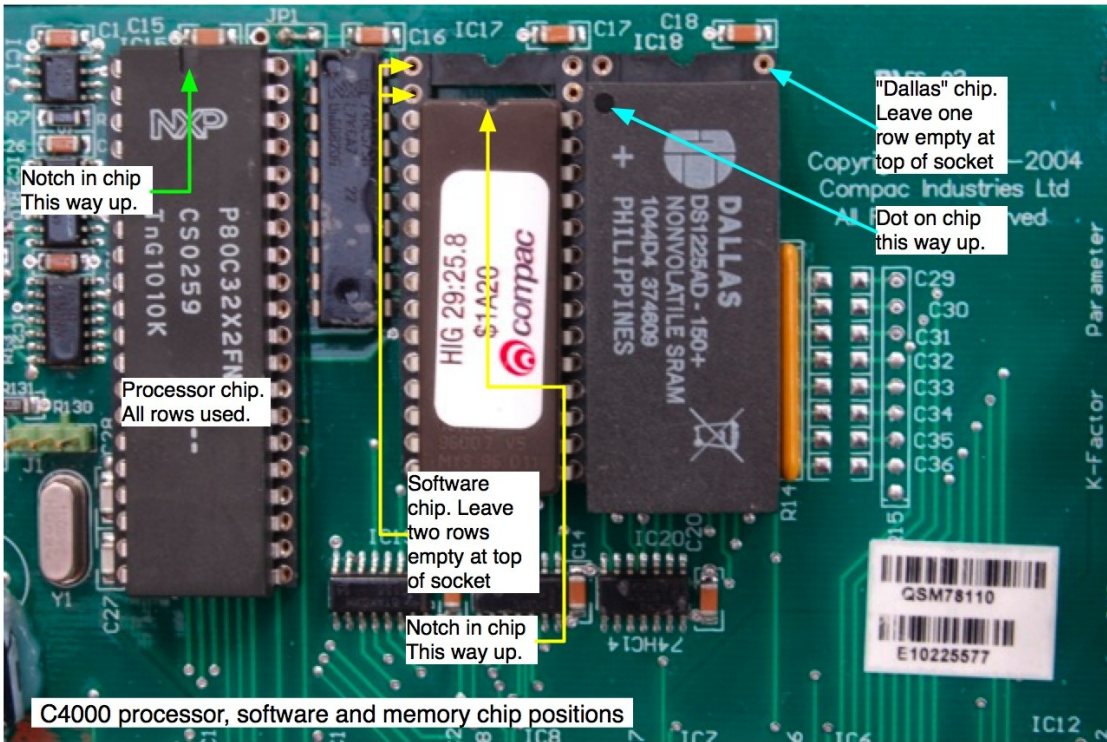


Figure 2: Processor, software and memory chip location.

Meter Replacement

Before you start, make sure you have:

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

Remove the Meter

1. De-gas the loading post (see page 23).
2. Remove the tubing from the meter inlet and outlet.
3. Unscrew the SAE fittings from the meter inlet and outlet.
4. Unplug the meter connections to the C4000 processor.
5. Undo the four bolts that hold the meter on the loading post frame.
6. Remove the meter.

Install new Meter

- 1.
2. Reverse the steps above to install the new meter.
3. Enter the new meter K-Factor into the C4000 processor Meter K Factor (see page 18)
4. Check the loading post calibration by either weight or with the Master Meter (see page 40)

Unserviceable Parts List

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

| Part | Comment |
|---------------------------|--|
| KG meter | The KG meter: <ul style="list-style-type: none">▪ Can have its firmware upgraded by approved service agents.▪ Can only be serviced by Compac.▪ Has no set-up functions.▪ Is self-characterising. The only function performed in the set-up is setting the K-Factor on the C4000 head. |
| C4000 power supply | |
| C4000 CPU Board | |
| Nozzles | |
| Solenoid stem | Replacing the solenoid stem seal requires special tooling. |

Loading Post Calibration

Meter Calibration

Calibrating the meter involves:

- Comparing the loading posts 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 loading post is factory set and usually does not need to be changed.*

Test the meter accuracy

Record the loading post's current density factor and set it to read out in kg Density Factor (**dSF**) (see page 18)

1. Test the meter accuracy using Calibration Test Fill Procedure - Method 1 (see page 41) or Calibration Test Fill Procedure - Method 2 (see page 41)

Calculate the meter K-Factor

1. Make sure that the loading post is idle, with the nozzle in its holster.
2. Press and release the **K-Factor** switch nine times.

The display shows the K-Factor as **F X.XXXX** (single nozzle loading post) or **FA X.XXXX** (Side A of a dual nozzle loading post).

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 **Fb X.XXXX** (side B of a dual nozzle loading post).

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

3. Calculate the new K-Factor with the following formula:

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

For example:

$$\text{Existing K-Factor} = 0.98$$

$$\text{Displayed amount} = 5.80 \text{ kg}$$

$$\text{True quantity} = 6.00 \text{ kg}$$

$$\text{New K-Factor} = \frac{0.98 \times 6.00}{5.80}$$

$$= 1.0138$$

$$= 1.0138 \text{ (4 decimal places)}$$

Input loading post settings

1. Input the new meter K-factor (**FA**) (see page 18)
Set the density factor back to its original value. (**dSF**) (see page 18)

Calibration Test Fill Procedure (Method 1)

Method 1 of checking calibration involves loading a gas cylinder and comparing the read-out scale reading with the loading post 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):

1. Put an empty CNG cylinder on the scales and take note of its weight.
2. Fill the CNG cylinder via the loading post.
3. Subtract the original weight from the full cylinder weight and compare with the weight shown on the post display.

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 tank and comparing a master meter reading with the loading post 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 Compac Master Meter or other calibrated CNG meter.

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

1. Connect the master meter between the loading post and a cylinder.
2. Turn on the master meter valve, if applicable, and reset to zero.
3. Commence a fill. You do not have to do a complete fill, you can stop the fill at any time.
4. Turn off the post valves and master meter valve, if applicable.
5. Compare the master meter read-out (True Quantity) with the loading post 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.

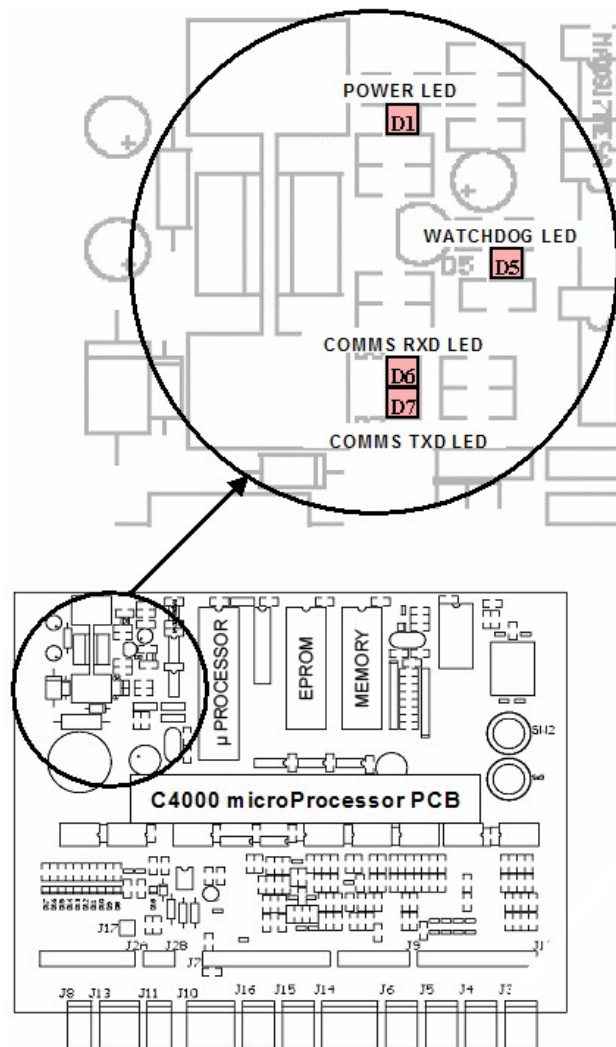
Indicator LEDs

Power and Watchdog LEDs

The **power, watchdog, comms RXD and TXD LEDs** indicate the operational state of the loading post.

LED Indicators

| LED | Reference | Lit When |
|----------|-----------|---|
| Power | D1 | The processor board has power.(on) |
| Watchdog | D5 | The watchdog circuit has been triggered. This indicates that there is a fault on the processor board.(on) |
| RXD | D6 | Polling information has been received. (flashes on/off) |
| TXD | D7 | The C4000 processor responds to polls for its respective hose number(s).(flashes on/off) |



Diagnostic and Output LEDs

The **diagnostic and output LEDs** indicate the operational state of the loading post.

Diagnostic LED

The diagnostic LED D18 flashes in three different states when the processor is working properly, as outlined in the table below.

| State | LED Flashes | When |
|-------|--------------------------|---|
| 1 | Slowly and consistently. | The hose is idle and in stand-alone mode. |
| 2 | Slowly but erratically. | The hose is idle and communicating with a Controller. |
| 3 | Quickly. | Start button is being pressed or the nozzle has been lifted from its holster. |

Output LED

The 10 output LEDs (D8-D17) pictured correspond to the output triacs, which engage power terminals (T1-T10).

When the output triac switches on and engages a power terminal, the corresponding output LED lights up. When the power is disengaged, the LED is not lit.

The output LEDs can be used to troubleshoot problems with the components supplied by the power terminals.

The table below outlines which LED is associated to which power terminal and the component that it controls.

| LED | Power Terminal | Component Controlled |
|-----|----------------|---|
| D8 | T1 | Solenoid. |
| D15 | T8 | Finished dispensing. (Turns off when the nozzle is stowed.) |
| D17 | T10 | Error indication. |

Troubleshooting

This troubleshooting section outlines issues that you may encounter when using the loading post, and provides recommended actions to help you correct these problems.

To help quickly diagnose possible problems you should check the loading posts End of sales indicator End of Sale indicators (see page 58) and review the Error Codes (see page 57).

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

NOTE *When servicing a Compac CNG Loading post fault, please follow the recommendations and safety information in this manual. Failure to do this may cause injury or void the warranty.*

The troubleshooting items have been divided into the following categories:

- Problems When Idle
- Problems Starting a Fill
- Problems Filling
- Solenoid Problems

Problems When Post is Idle

| Problem | Likely Cause(s) | Recommended Action |
|--|---|---|
| After powering the loading post, PA:uSE is displayed and the countdown from 60 doesn't start. | For push to start loading posts the start button is held down. | <ul style="list-style-type: none"> Release the start button. |
| | The nozzle is not stowed or the nozzle switch is active. | <ul style="list-style-type: none"> Correctly stow the nozzle. |
| The loading post pressure gauge creeps past 200 bar when the loading post is not in use. | The regulator centre seal is damaged. | <ul style="list-style-type: none"> Replace the Regulator Valve Seals (see page 31) |
| | The solenoid piston seal is damaged. | <ul style="list-style-type: none"> Replace the Solenoid Valve Seal (see page 27) |
| The C4000 electronics are not working. The indicator LEDs are off and nothing happens when you lift the nozzle (i.e., no beeps or 888888 is displayed). | Unacceptable voltage spikes are causing the fuses on the C4000 to blow. | <ul style="list-style-type: none"> Fit a voltage-stabilising UPS to the loading post. Replace the power supply fuses (see page 35) |
| | There is low input voltage. | <ul style="list-style-type: none"> Turn the loading post off and then on again. Check the power supply connections and input voltage to the loading post with a multimeter. A voltage-stabilising UPS will be required. |
| The Output LED T10 is ON. | An error state exists. | <ul style="list-style-type: none"> Remedy the cause of the error (i.e., Display, Memory, or KG meter) by checking the Fault Codes section (see page 57). Clear the error by quickly pressing the start button or nozzle switch five times to view the totes. |
| The watchdog LED D5 is illuminated. | A processing fault has occurred. | <ul style="list-style-type: none"> Turn the power to the loading post off and then on again to reset the watchdog. If the light still illuminates, there is a fault on the C4000 microprocessor board, such as a loose memory chip or a broken track. Replace C4000 memory and software chips Replace C4000 processor board |
| A display LCD segment is always on or always off. | Faulty display unit. | <ul style="list-style-type: none"> Replace Display PCB |

Problems Starting a Fill

| Problem | Likely Cause(s) | Recommended Action |
|--|--|--|
| When the start button is pressed the loading post does not display 888888 and reset for the next fill. | The start button or nozzle switch is faulty, stuck, or broken. | <ul style="list-style-type: none"> ▪ Check that the Diagnostic LED (D18) flashes quickly when you operate the start button or nozzle switch, to make sure that the C4000 is registering the button or switch. ▪ Check that the nozzle switch is operating correctly and is not broken, and that the mechanism is free to move in and out. ▪ Replace the button or switch if necessary. |
| | | <ul style="list-style-type: none"> ▪ |
| | The C4000 Microprocessor Board is faulty. | <ul style="list-style-type: none"> ▪ If none of the above suggestions resolve the problem, replace the C4000 Microprocessor Board. (see page 36) |
| Gas will not flow | There is no power to the solenoid. | <ul style="list-style-type: none"> ▪ Establish the reason why there is no power to the solenoid from the Solenoid Problem section (see page 48), and then implement the recommended action. |
| | The solenoid coil is burnt out. | <ul style="list-style-type: none"> ▪ Establish the reason for burn-out from the Solenoid Problem section (see page 48), and then implement the recommended action. |
| | The solenoid valve is stuck | <ul style="list-style-type: none"> ▪ Clean the solenoid and replace the valve seals. |
| | The check valve is stuck | <ul style="list-style-type: none"> ▪ Clean the check valve and replace the valve seals |
| | | <ul style="list-style-type: none"> ▪ |
| | Water in the gas has turned to ice, blocking the gas flow. (Wet gas causes freezing blocks in cold conditions, regardless of filtering.) | <ul style="list-style-type: none"> ▪ Pour boiling water onto the pipework where the freezing has occurred until the ice has thawed and the gas can flow. ▪ Contact your gas supplier |
| | The Over-Pressure switch has been activated (if present). | <ul style="list-style-type: none"> ▪ Check the pressure on the pressure gauge. If it exceeds 215 bar, the over-pressure safety will have shut down power to the solenoid but not the electronics and metering. ▪ De-gas the loading post to reduce the pressure. |

Problems Filling

| Problem | Likely Cause(s) | Recommended Action |
|---|---|---|
| The post is under filling | | |
| | | |
| | | |
| | Water in the gas mains has caused freezing, blocking the pipes. | <ul style="list-style-type: none"> ▪ Pour hot water on the frozen part of the loading post. ▪ Install a drier into the gas main. |
| | | |
| The loading post stops filling the vehicle after approximately 1kg of gas has been dispensed | The over pressure switch is faulty | <ul style="list-style-type: none"> ▪ Check the End of sale indicator to confirm there is a problem with the over pressure switch. ▪ Check the wiring to the switch and switch operation. Replace switch if no fault is found in the wiring. |
| | The over pressure switch link has come loose in J12 | <ul style="list-style-type: none"> ▪ Check the End of sale indicator to confirm there is a problem with the over pressure switch. ▪ Check the link in J12 is still in place and the contacts are clean. |
| The loading post is slow filling | Moisture in the gas mains has caused freezing in one or more of the valves. (This often occurs when water has not been cleared out of the gas pipes after testing.) | <ul style="list-style-type: none"> ▪ Pour boiling water onto the pipework where the freezing has occurred until the ice has thawed and the gas can flow. ▪ Contact your gas supplier |
| Gas flows but does not read up on the display. | The C4000 needs to be reset | <ul style="list-style-type: none"> ▪ Re-power loading post. |
| | Solenoid valves are not closing at the end of a fill when the loading post stops metering because of dirt and/or water contamination. | <ul style="list-style-type: none"> ▪ Clean the solenoid and replace the valve seals. |
| | The meter is faulty and has stopped recording flow. | <ul style="list-style-type: none"> ▪ Replace the meter (see page 38). |
| The loading post stops at 9999.99 , 99999.9 , or 999999 units according to where the decimal point is set. | The loading post will stop dispensing if either the value or the quantity displays ever reach these values. | <ul style="list-style-type: none"> ▪ Hang up the nozzle to reset the display and restart. This is not a loading post fault. |

Solenoid Problems




| Problem | Likely Cause(s) | Recommended Action |
|--------------------------------|---|--|
| The solenoid is not opening | Check that the power is reaching the coil and it is energising. Place a screwdriver (or similar metal object) over the top of the coil and feel the magnetic field created by the energised coil. | <ul style="list-style-type: none"> ▪ If there is no magnetic field check the LED for the triac. If the triac LED light is coming on check that the triac is delivering power. ▪ If the triac is delivering power but the coil is not energising then the coil is burnt out. Replace the solenoid coil and, using the troubleshooting information below, investigate why it has failed. |
| | The solenoid coil is burnt out | <ul style="list-style-type: none"> ▪ See the solenoid coil is burnt out section below. |
| | The solenoid piston seals are damaged, jamming the piston in the closed position. | <ul style="list-style-type: none"> ▪ Clean the solenoid and replace the valve seals. |
| The solenoid is not closing | The solenoid piston seals are damaged, jamming the piston in the open position. | <ul style="list-style-type: none"> ▪ Clean the solenoid and replace the valve seals. |
| | There is dirt or water in the gas supply, jamming the piston in the open position | <ul style="list-style-type: none"> ▪ Clean the solenoid and replace the valve seals. ▪ Change the filter and remove the water source or install a drier. |
| The solenoid is not sealing | The solenoid piston seals are damaged. | <ul style="list-style-type: none"> ▪ Clean the solenoid and replace the valve seals. |
| | There is dirt or water in the gas supply. | <ul style="list-style-type: none"> ▪ Clean the solenoid and replace the valve seals. ▪ Change the filter and remove the water source or install a drier. |
| The solenoid coil is burnt out | Dirt or water in the solenoid has prevented the armature from rising and opening the solenoid, resulting in the solenoid coil heating up and burning out. | <ul style="list-style-type: none"> ▪ Replace the solenoid coil ▪ Clean the solenoid and replace the valve seals. ▪ Change the filter and remove the water source or install a drier. |
| | High voltage or voltage spikes have caused the solenoid coil to burn out | <ul style="list-style-type: none"> ▪ Fit a voltage stabilising UPS to the loading post power supply ▪ Replace the solenoid coil |
| | Coil has been removed from solenoid and energised, causing the coil to burn out | <ul style="list-style-type: none"> ▪ Replace the solenoid coil |
| Finally | If the solenoid is still not working reliably | <ul style="list-style-type: none"> ▪ Fit the solenoid top service kit. Refer to valve seal replacement (see page 27) |

Appendix


Approvals

The C4000 electronic head is ATEX approved for use in a Class 1, Zone 1 hazardous area. Loading posts 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 ($T_{amb} = -25^{\circ}\text{C}$ to $+55^{\circ}\text{C}$) | A Type C4000 Control Unit | Baseefa03ATEX0612 |
|  II (2)G [EEx ib] IIA ($-25^{\circ}\text{C} \leq T_a \leq 80^{\circ}\text{C}$) | C4000 Power Supply Unit PCB CI138 & CI139 | Baseefa03ATEX0684X |
|  II G EEx ib IIA T3 ($-25^{\circ}\text{C} \leq T_a \leq 80^{\circ}\text{C}$) | C4000 Control Unit | Baseefa03ATEX0683X |
| (CWIT Aerial only:-  II 1G EEx ia II A T3 | | |

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 |
|---|---|--|
|  Cat. II Group I | Filter housing, solenoid, & various dispenser models. | SGS UK Ltd. 0790/025074 |

Specifications

Technical Specifications

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

They 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 temperatures | - 40 °C to + 80 °C (continuous) - 55 °C to + 80 °C (intermittent) |
| Maximum Water Dew Point | - 32 °C at 250 bar |
| Maximum Working Pressure (Inlet) | 275 bar (350 bar option) |
| Power Requirements | 230V +/-10%, 50Hz, 2A |

| Specific Specifications | Standard Model |
|---|--------------------------------|
| Flow (The maximum flow rate is not only determined by the type of loading post 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 |
| Pressure rating (350 bar options utilise air actuated valves and require a compressed air supply.) | 275 bar (350 bar option) |
| Accuracy | +/- 1.0% |
| Meter | Compac KG80 coriolis mass flow |
| Internal Pipework | 1/2" |
| Hose | 3/8" |
| In-line breakaways | Various available |
| Refuelling valve | NGV1 or NZ 7/16" probe |
| Loading meter overall dimensions L x W x H | 400 mm x 400 mm x 2440 mm |
| Minimum flow cut-off | 0.5 -10 kg/min (settable) |
| Maximum flow cut-off | 10 - 99 kg/min (settable) |

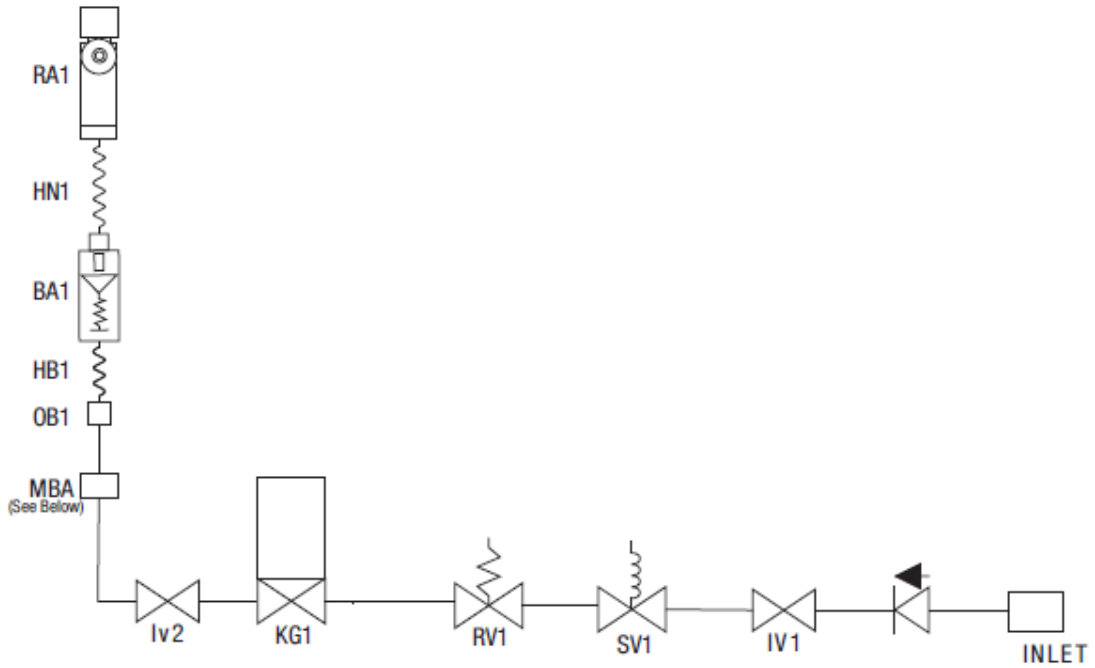
Component Specifications

See below for information on serviced equipment.

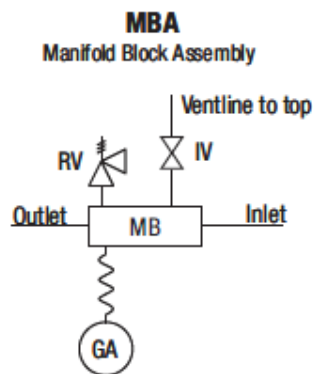
| Equipment Item | Compac Code | Specifications | Description |
|----------------------------|-------------------------------|--|--|
| Coalescing filters | | Grade 10 Coalescing Filter | The coalescing filters are designed to trap dirt, moisture, oil, and other debris that may damage the valve seals. A Grade 10 coalescing filter will remove 95% of liquid aerosols in the 0.3 to 0.6 micron range. |
| Compac filter/check valve | FCVCI-12-SS | 3/4" SAE female inlet. 2 x 3/4" SAE female outlets. 350 bar max. | The filter/check valve prevents back-flow from the high storage to the medium and low storage and from the medium storage to the low storage. The valve has a metal to metal seat and should not leak or require servicing. |
| Solenoid valve | SCI-12-SS | 3/4" SAE female inlet. 3/4" SAE female outlet. 275 bar max. | The high flow solenoid valve is designed to control the flow of gas in a CNG loading post. Between the inlet and outlet, the valve opens with a differential pressure of more than 275 bar. |
| Regulator valve | RCI-12-SS | 3 x 3/4" SAE female inlets. 3/4" SAE female outlet. 275 bar max. | The regulator is a high flow valve, designed to limit the outlet pressure of the loading post. In the fixed pressure loading post , the regulator limits the final fill pressure to 200 bar. |
| Three-way refuelling valve | 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 Loading Post Component Location section. Do not re-pipe the valve in a different configuration. |
| Nozzles | 7/16" NZ Probe 1-15 kg/min | 1/4" NPT port. | In New Zealand, the probe complies with NZS 5425.1. In Australia, the probe complies with AS/NZS 2739. |
| | OPW CT1000 1-50 kg/min | 9/16" SAE inlet port 200 bar max. | Nozzles allow refuelling for high pressure NGV applications. |
| | OPW CT5000 1-80 kg/min | 7/8" SAE inlet port 250 bar max. | Nozzles allow refuelling for high pressure NGV applications. |
| Inline breakaways | QBCI-09 1-15 kg/min | 9/16" SAE inlet & outlet ports | Brass inline breakaway with reconnectable design. |
| | OPW ILB- 1 1-50 kg/min | 9/16" SAE inlet & outlet ports. 250 bar max. 150 to 200 lbs (668 to 890 N) breakaway force. | Inline breakaway with reconnectable design. Corrosion-Resistant with high flow for all NGV-1 nozzles. |
| | OPW ILB-5 1-80 kg/min | 7/8" SAE inlet & outlet ports. 310 bar max. 150 to 200 lbs (668 to 890 N) breakaway force. | Inline breakaway with reconnectable design. Corrosion-Resistant with high flow quick fuelling of large storage vehicles. |
| Isolation ball valve | | | Parker 2-way 8 series ball valve |
| Microprocessor | C4000 | | The Compac C4000 processor controls all the electronics in the loading post. |

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

Hydraulic Layout – Loading Post



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



| | | |
|--|----|----------------|
| | MB | Manifold Block |
| | GA | Pressure Gauge |
| | BV | Bleed Valve |
| | RV | Relief Valve |

| Item | Part Number | Description |
|-------------|---------------------------|--|
| A | FC-COIL-0001 | SCI-12-SS Solenoid Coil (Parker) With 3 Meter Lead |
| B | FC-SK-0001 | SCI-12-SS Solenoid Seal Kit |
| | FC-VALVE-PSTN-0001 | SCI-12-SS Solenoid Piston |
| | FC-SVK-0001 | SCI-12-SS Solenoid Top Service Kit |
| | FC-VALVE-0018 | SCI-12-SS Complete 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 |

Spare parts

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

Loading Post Spare Parts

| Item | Part Number | Description |
|------|-------------------|---|
| A | F-CP-DISPLAY-R1 | GD1 Display With One Unit Price LCD (CI170) |
| | F-CP-DISPLAY-R2 | GD1 Display With Two Unit Price LCDs (CI170) |
| | 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 |
| | FC-B8-HDLRED | Isolating Valve Handle (Red), Parker 2 Way 8 Series |
| | FC-B8-HLDGSCR-SS | Isolating Valve Handle Grub Screw, Parker 2 Way 8 Series |
| D | F-CP-PROCES-A | C4000 Processor Board, No Memory Or Software (CI140) |
| | F-AD-DS1225 | Dallas Memory Chip |
| | F-CS-IC-C4DISP | Software Chip (Please Specify Code Version Required When Ordering) |
| E | F-CP-C4PWR-CNG | C4000 Power Supply (CI138/139) for CNG |
| | F-C4PWR-FUSEKIT | C4000 Power Supply Fuse Kit |
| | F-CP-C4GILB-I/F-K | Gilbarco Interface Board Kit For C4000 Power Supply |
| F | FC-PBSW-ESTOP | Red Stop Button With Mushroom Head |
| | FC-PBSW-START-001 | Green Start Button |
| G | F-D-METER-KG80VT | KG80 Mass Flow Meter - Ventilated Core |

Fuses

There are 3 fuses in the C4000 power supply. The unit is supplied with a set of spare fuses inside the flameproof box.

| Fuse | Rating | Comment |
|------|--------|--|
| F1 | 0.5 A | Fuses F1, F2, and F3 should be 5 x 20 mm glass normal blow type, and should comply with IEC127, 35 Amp minimum rupture current. |
| F2 | 0.25 A | |
| F3 | 1.0 A | |

Error Codes

Error codes indicate any problems with the loading post. 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 Compac CNG equipment.

NOTE When servicing Compac CNG equipment, please follow the recommendations in this manual. Otherwise you may injure yourself and void the warranty.

| Error Code | Likely Cause | Recommended Action |
|---------------|---|---|
| Err 5 | The Stop switch is latched on. | <ul style="list-style-type: none"> ▪ Establish why the Stop switch was operated. ▪ If safe, reset the switch by rotating the button clockwise. |
| Err 8 | Excessive reverse flow will cause this fault. | <ul style="list-style-type: none"> ▪ Check and clean all check valves. |
| Err 9o | The meter has not started (Tubes are not vibrating) | <ul style="list-style-type: none"> ▪ Check that the meter is plugged in. ▪ Check the plug connections to and from the meter. ▪ Re-power the loading post. ▪ If the connections are correct, then there is a fault with the meter and it must be replaced. Refer Meter Replacement (see page 38) |
| Err 9b | The meter has not zeroed | <ul style="list-style-type: none"> ▪ Check that the meter is plugged in. ▪ Check the plug connections to and from the meter. ▪ Re-power the loading post. ▪ If the connections are correct, then there is a fault with the meter and it must be replaced. Refer Meter Replacement (see page 38) |
| Err 9c | Fault in temperature device | <ul style="list-style-type: none"> ▪ Re-power the loading post. ▪ If the error does not clear after re-powering the loading post there is fault with the meter and it must be replaced. Refer Meter Replacement (see page 38) |
| Err 9d | Meter coil Fault | <ul style="list-style-type: none"> ▪ Re-power the loading post. ▪ If the error does not clear after re-powering the loading post there is fault with the meter and it must be replaced. Refer Meter Replacement (see page 38) |
| Err 9e | Slug flow (Ice, Grit, Oil etc) | <ul style="list-style-type: none"> ▪ Check and clean the loading post filters. ▪ Re-Power the loading post ▪ If the error does not clear after re-powering the loading post there is |

| | | |
|---------------|---|---|
| | | fault with the meter and it must be replaced. Refer Meter Replacement (see page 38) |
| Err 9f | Reverse Flow. | <ul style="list-style-type: none"> ▪ Check the Filter /Check valve seals ▪ Re-Power the loading post ▪ If the error does not clear after re-powering the loading post there is fault with the meter and it must be replaced. Refer Meter Replacement (see page 38) |
| Err 10 | No Configuration data | <ul style="list-style-type: none"> ▪ Check that all of the parameters on the K-Factor and Parameter switches are correctly set. Parameter Switch (see page 17), K Factor Switch (see page 17) |
| Err 12 | EPROM failure. | <ul style="list-style-type: none"> ▪ Replace the software Eprom. Loading post Software Upgrade/Replacement (see page 37) |
| Er FLO | Maximum flow rate has been exceeded. | <ul style="list-style-type: none"> ▪ If continually happening, adjust the maximum flow rate settings (HFA & HFb) using the K-factor switch (see page 19). |
| PA:uSE | The loading post is in start-up mode. | <ul style="list-style-type: none"> ▪ Hang up the nozzle. ▪ The PA:uSE message stays on the display for 60 seconds, then changes to 0.00. When the display changes to 0.00, the loading post is ready to dispense gas. |
| STOP | The Stop switch is latched on. | <ul style="list-style-type: none"> ▪ Establish why the Stop switch was operated. ▪ If safe, reset the switch by rotating the button clockwise. |
| :0.0 | The loading post's power supply has been turned off and back on since the last transaction. | <ul style="list-style-type: none"> ▪ The colon disappears when the nozzle is lifted for the next transaction. |
| Ab d | The main display is not communicating correctly. | <ul style="list-style-type: none"> ▪ Check that the display is plugged in correctly. ▪ Check the condition of the display cabling and make sure that no wires have come out of the plugs. ▪ Replace display if necessary. |

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

1. Press and release the **Parameter** switch until the required hose number (**Pn**, **PnA** or **Pnb**) is displayed.
2. 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 loading posts). | |
| 3 | Fill timed out. Start button pressed, or nozzle lifted, without flow. | Check inlet gas pressure. Check solenoid operation. Refer Solenoid Problems Check nozzle and breakaway for blockages. |
| 5 | Maximum display value reached. | |
| 7 | An error has occurred. The error will be shown on the main display. | Check error code reason. Refer Error Codes (see page 57) |
| 8 | Outputs sequenced normally and loading post finished on the low flow cutoff setting. Normal end of sale message for regulator controlled loading posts | |
| 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. |
| 25 | Stop switch operated. | Check the stop switch wiring and switch operation. |
| 30 | Maximum flow rate exceeded. | |
| 31 | Over-pressure switch has been activated. | |
| 32 | Loading post on Hold . (No fuel will be dispensed). | |