C5000 AdBlue Dispenser Service Manual

C5000 AdBlue Dispenser Service Manual

Version 1.0.5

Model: C5000 Controlled AdBlue Dispensers

Date: 17th September 2020

compac
INTEGRATED REFUELLING SOLUTIONS

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Product Identification

Specifications	
Manual Title	C5000 AdBlue Dispenser Service Manual v.1.0.5
Original Publication Date	7/11/19
Models Covered	This manual applies to C5000 controlled pumps and dispensers. ***NOTE:*** *Do not use this manual for earlier models. Contact Compac for archived manuals if required.*

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

CONDITIONS

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1.0.0	07/11/2019	S Laycock V Amarakoon	New manual Servicing
1.0.1	05/02/2020	V Amarakoon	Updated Solenoid piston assembly diagram
1.0.2	29/07/2020	V Amarakoon	Changed the density to 997
1.0.3	30/07/2020	V Amarakoon	Updated the COMMS board
1.0.4	07/08/2020	V Amarakoon	Updated End of sale indicators, Updated Slave display configurations
1.0.5	17/09/2020	V Amarakoon	Added CC settings, Updated spare parts

Contents

Contents

Safety

PRECAUTIONS

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

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

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

Electrical Safety

Observe the following electrical precautions:

Always turn off the power to the Compac C5000 processor before opening the flame proof box. Never touch wiring or components inside the high voltage area with the power on.

Always turn off the power to the Compac C5000 processor at the mains switch before removing or replacing software or memory ICs.

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

Site Safety

Obey all company regulations and site specific instructions relating to the installation. Before working on any hydraulic equipment, drain the dispenser in an approved manner.

Static Electricity Precautions

Electronic components used are sensitive to static. Please take anti-static precautions.

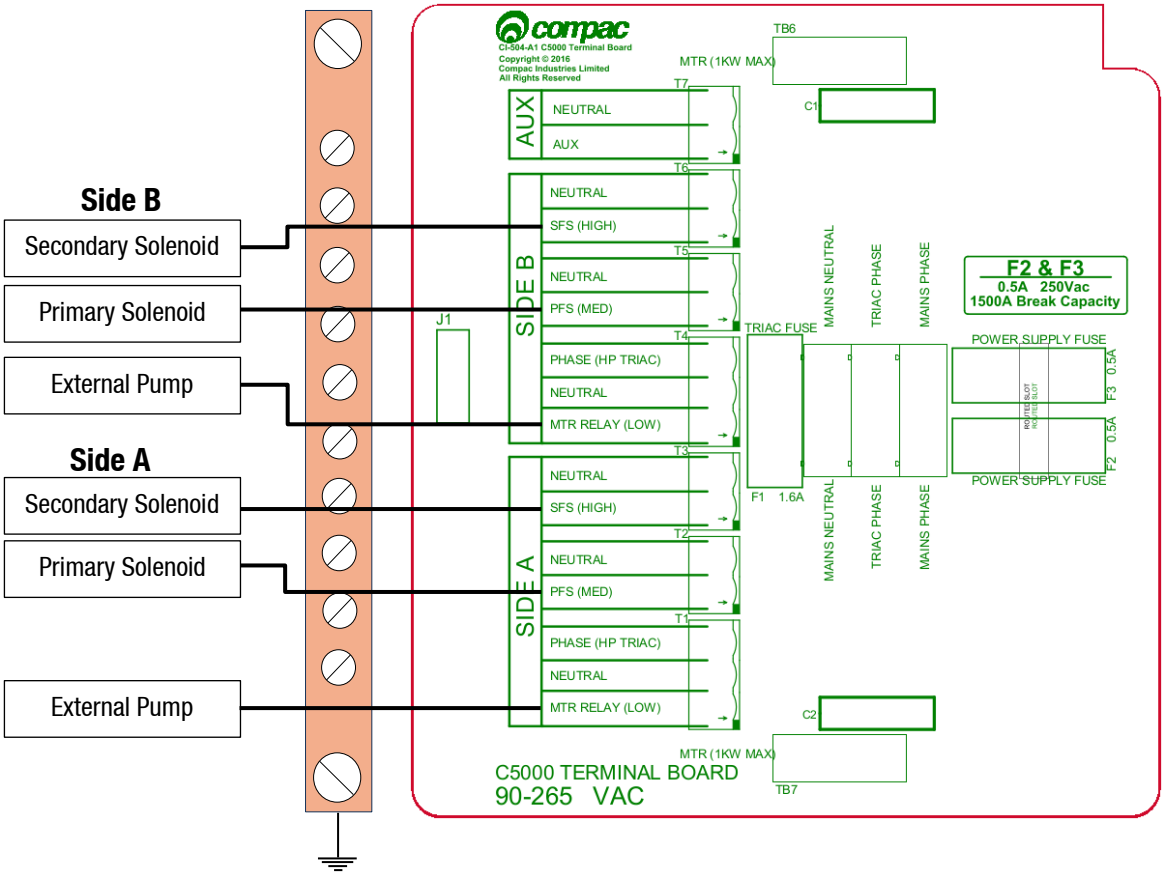
All circuit boards must be carried and transported in static-shielded bags. An anti-static wrist strap should be worn and connected correctly when working on any electronic equipment. If an anti-static wrist strap is unavailable, or in an emergency, hold onto an earthed part of the pump/dispenser frame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

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

Typical Wiring

As well as connecting the incoming mains, the external pump contactors will have to be connected to the terminal board.

Solenoids for side A and B are optional and can be wired in if preset and prepay options are desired.

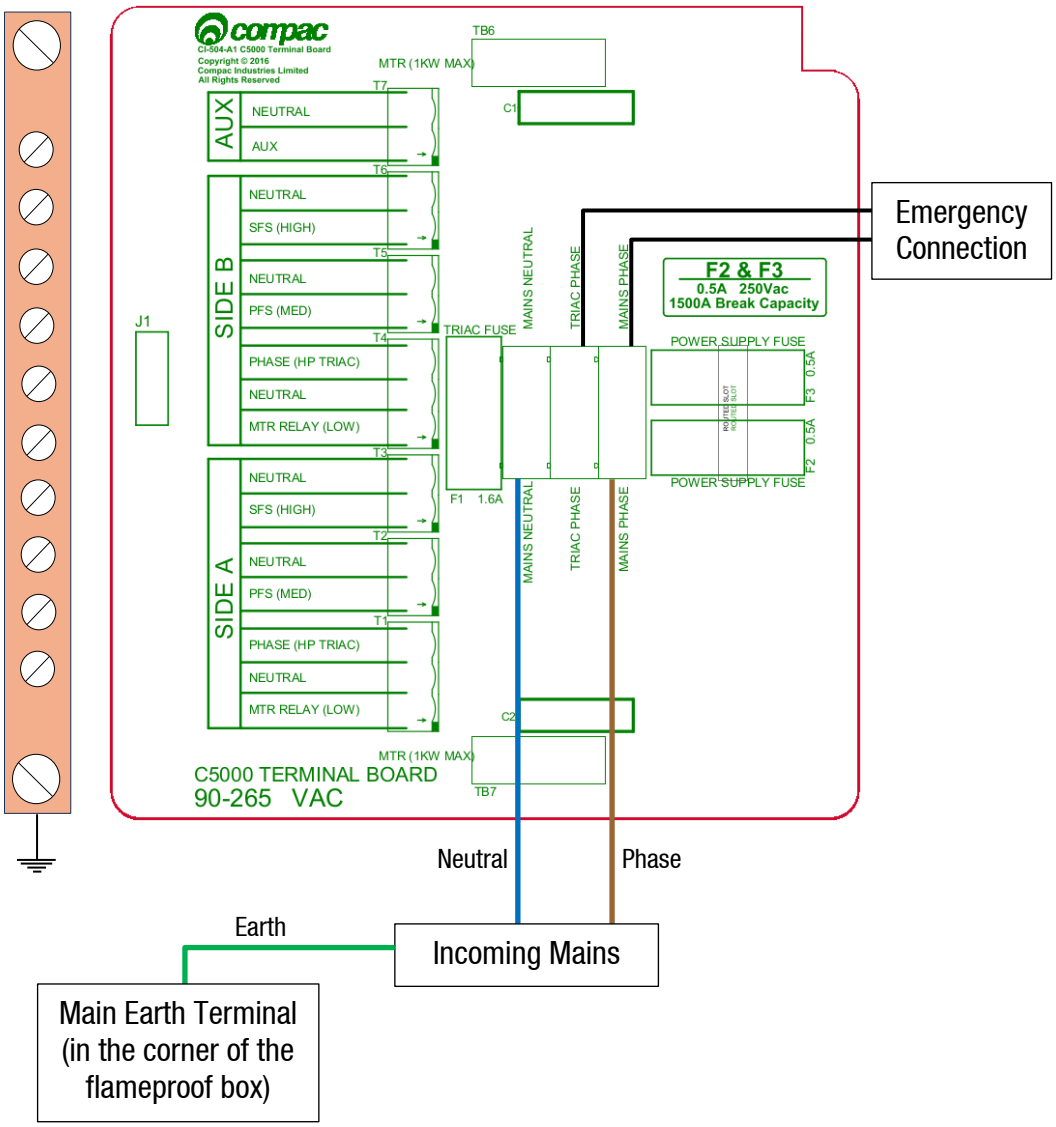


Incoming Mains

Incoming mains connections should be brought into the terminal board.

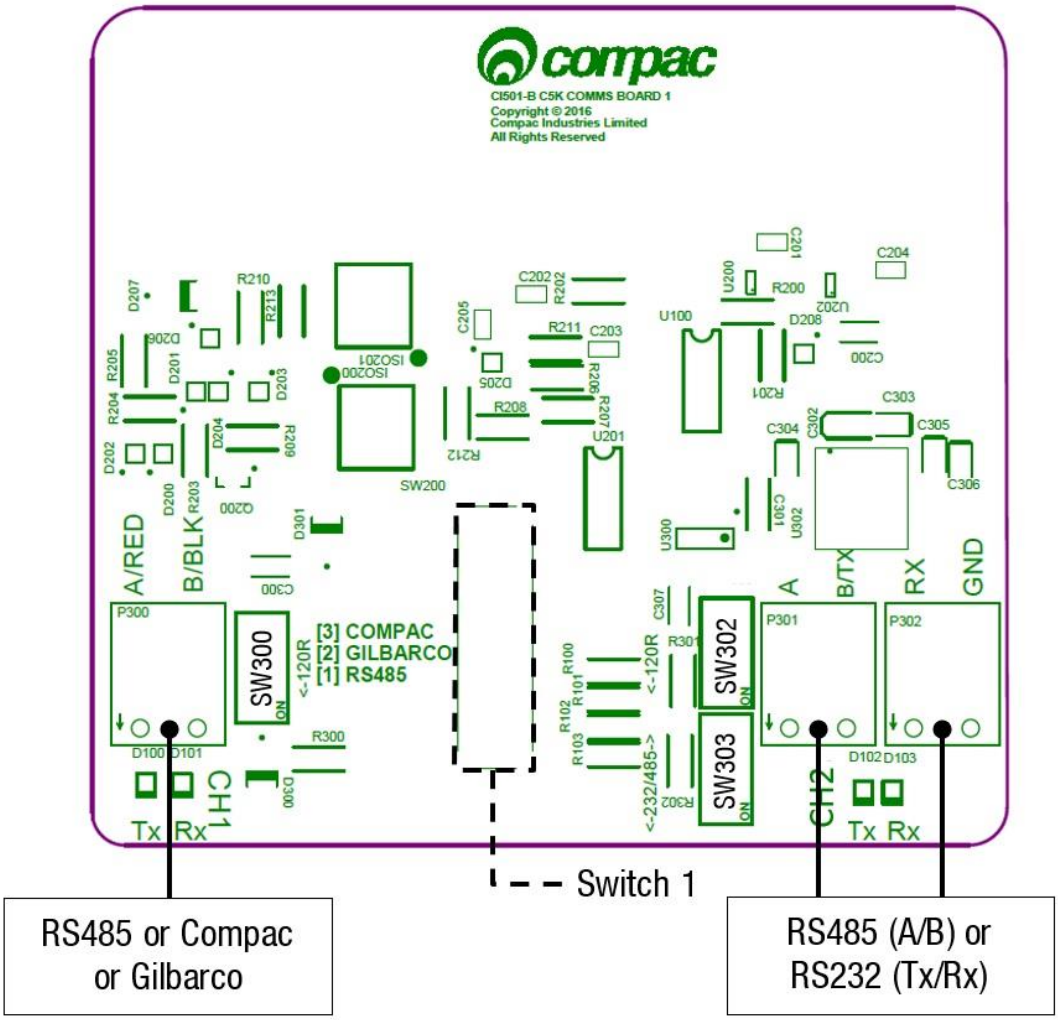
An emergency stop connection, if desired, can also be wired into the terminal board, shown below. This will be in place of the normal loop between the triac and main phases. Wires have standard colours which are shown. In case these are unclear, the colours are as follows:

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



Comms Connections

The comms I/O is controlled by the connections to the Comms board. Refer to the following diagram for connecting RS485, RS232, Compac or Gilbarco pumps. The shown switch should be set to the desired setting.

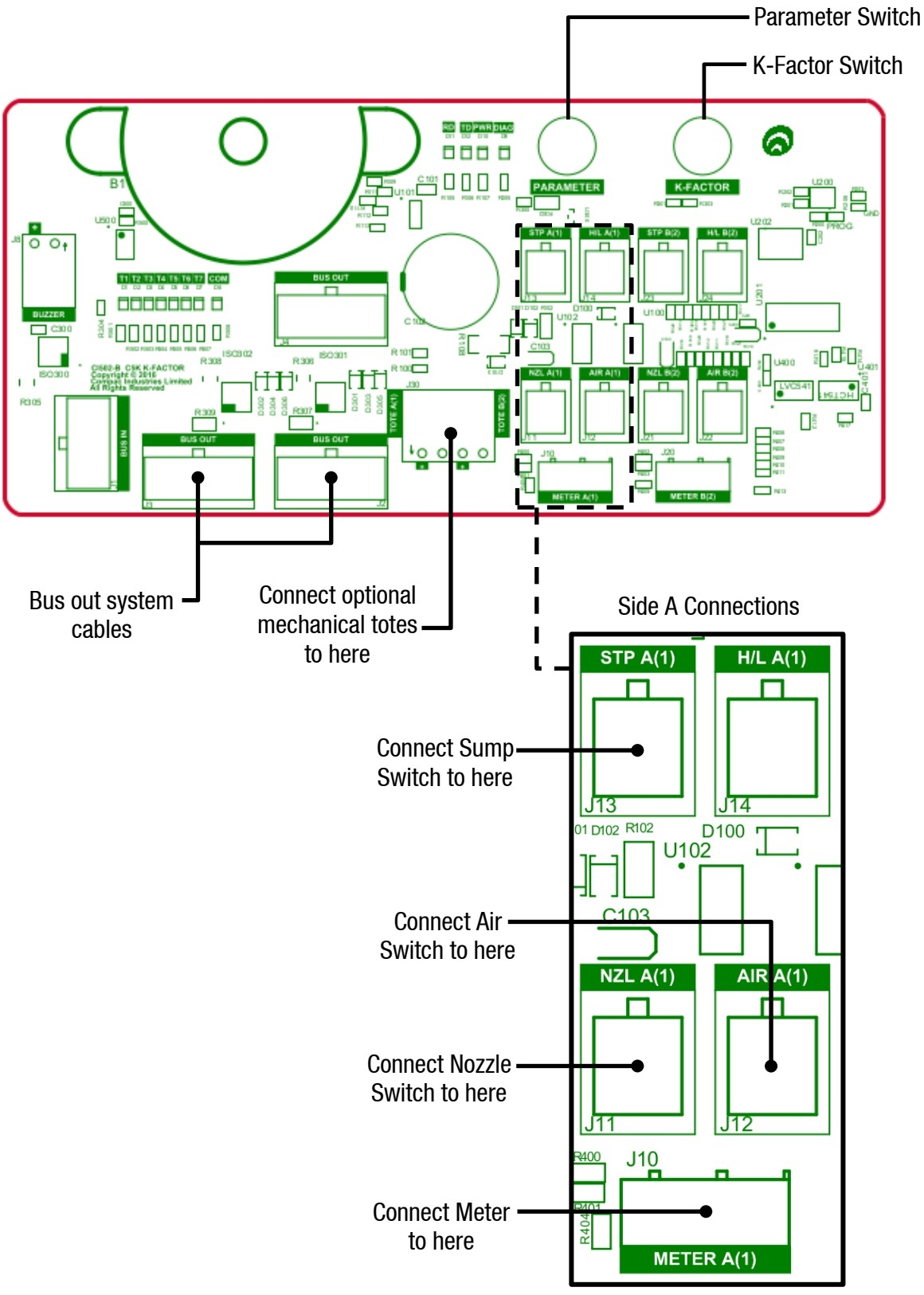


Switches 300, 302, and 303 are for RS485/RS232 Terminator application. Use the following table to configure these switches. Switch 300 is for channel 1, and switches 302 and 303 are for channel 2.

	SW300	SW302	SW303
RS485 (Channel 1)	ON	-	-
RS485 (Channel 2)	-	ON	OFF
RS232 (Channel 2)	-	OFF	ON

K-Factor Board

Both the Parameter switch and K-Factor switch are found on the K-Factor board. Meters and air switches are also connected to this board. See below for the location of these.



K-Factor Settings

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

Setting	Price display	Litres display
Dispenser settings	c-A or c-b	*******
Meter ID	id-A or id-b	******
Temperature calibration	E-A or E-b	***.
Density calibration	d 15-A or d 15-b	****.
Maximum flow		9A **** or 9b ****
K-Factor	FA or Fb	******.
Configuration code	c	*******
Comms	cc	****
Solenoid delay		SdA *** or Sdb ***
Preset cutoff		PcA ***. or Pcb ***.
Preset rounding		PrLA***. or PrLb***. PrHA***. or PrHb***.
Flow time out		n-A *** or n-b ***

Using the Dispenser Menus

When changing settings on the dispenser, pressing the K-Factor switch in quick succession cycles between the options available. The location of this switch can be found on page 6. Each press of the button will cycle between the digits. When going through the menus, each menu will cycle through the digits twice for ease of operation.

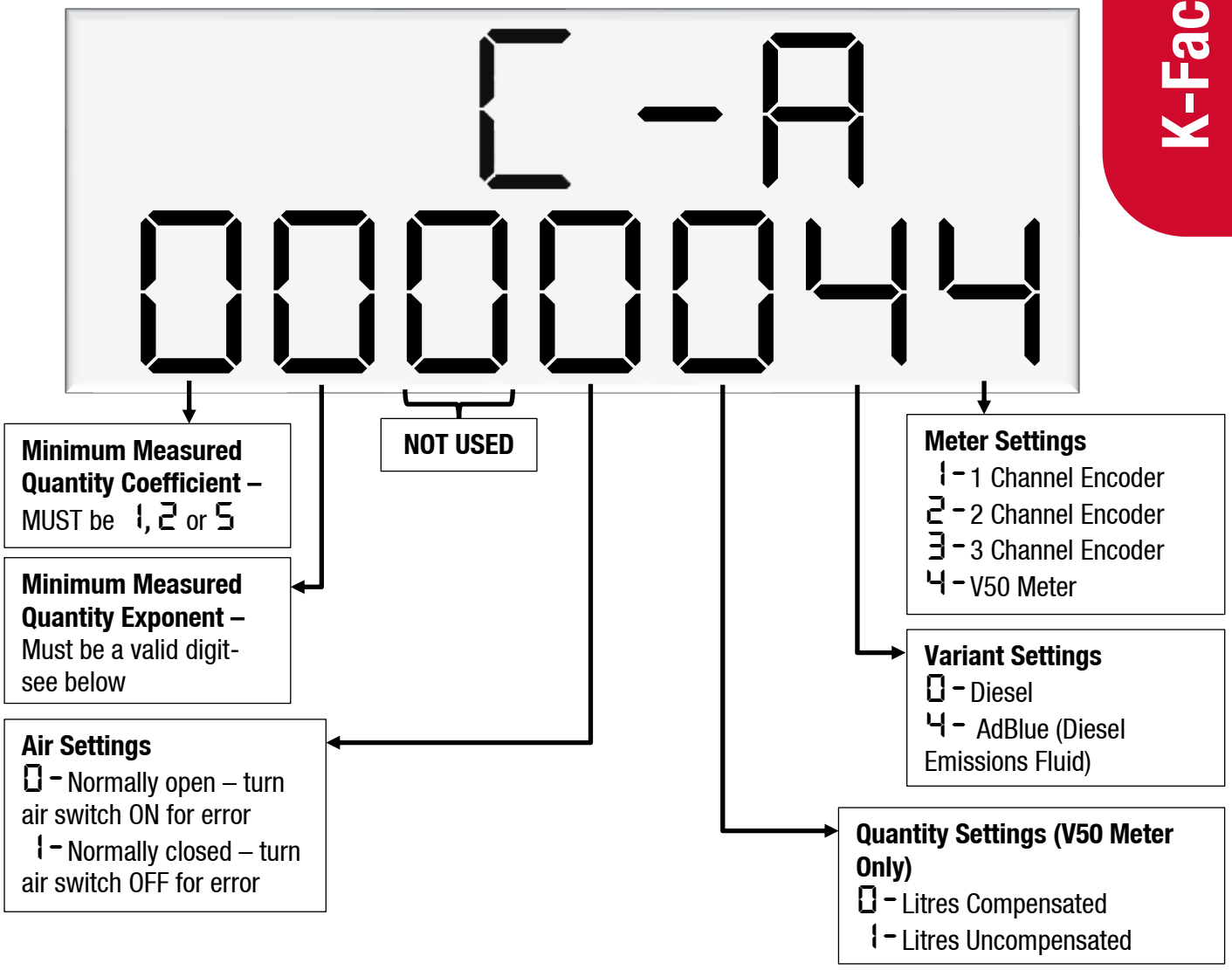
When a digit is flashing, hold down the relevant switch to increment this digit. Release the switch on the desired value.

The system timeout is 10 seconds.

Dispenser Settings

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

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



Meter Settings

This setting corresponds to the type of meter plugged in to the dispenser. Options 1-3 are for an encoder meter and depend on the channel setting of this meter. This should be selected if a hose is using diesel. V50 meters (option 4) are used for AdBlue and should be selected for hoses using AdBlue.

Some settings (such as temperature and density calibration) are only available for V50 and therefore will not appear if the meter type is not set to V50. These will therefore not appear for hoses using diesel.

Variant Settings

This setting should be changed depending on the product – set the variant to 0 for diesel. Set the variant to 4 for diesel emissions fluid (AdBlue).

Quantity Settings

This setting is what quantity will be shown on the main display when fuel is being dispensed. This is only valid for V50 meters and is ignored for encoder meters which always display Litres uncompensated.

Air Settings

Air switches can be turned on or off to trigger this error, depending on this setting.

Minimum Measurable Quantity (MMQ)

Minimum measured quantity (MMQ) is the minimum amount of fuel that can be dispensed and measured. The MMQ is calculated with the following equation:

$$MMQ = M\ x\ 10^{n}$$

With the value in litres. For example, if the coefficient was set to 2, and the exponent was set to 1:

$$MMQ = 2\ x\ 10^{1} = 20L$$

So the minimum delivery would be 20 litres.

The exponent can only be certain values;

- If the coefficient is 1, the exponent can be 0, 1, 2, 3 (valid values are then 1, 10, 100, 1000)
- If the coefficient is 2, the exponent can be 0, 1, 2 (valid values are then 2, 20, 200)
- If the coefficient is 5, the exponent can be 0, 1, 2 (valid values are then 5, 50, 500)

If either of the values entered are not valid, or the value is left as 00, the MMQ will be calculated from the maximum flow. The MMQ is the maximum flow x 0.05. For example, if the maximum flow was 40 (the default):

$$MMQ = 40\ x\ 0.05 = 2L$$

Note that the MMQ still must be one of the valid values listed above. If the MMQ is calculated from the maximum flow, and is NOT one of the valid values listed above, it will be rounded up to the next valid value. For example, if the maximum flow was 600:

$$MMQ = 600\ x\ 0.05 = 30L$$

30L is not a valid value, and therefore the MMQ would be rounded up to 50L.

The MMQ sets the display suppression. When a transaction starts, the quantity dispensed will not show until a percentage of the MMQ has been dispensed. Display suppression is 2% of the MMQ. For example, if the MMQ is 2L:

$$2\ x\ 0.02 = 0.04$$

So the quantity dispensed will not show until more than 0.04L has been dispensed.

Changing the V50 Meter ID

All V50 meters have a specific ID which must match the ID recorded in the dispenser settings. This is a 6-digit number which can be found on the meter.

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

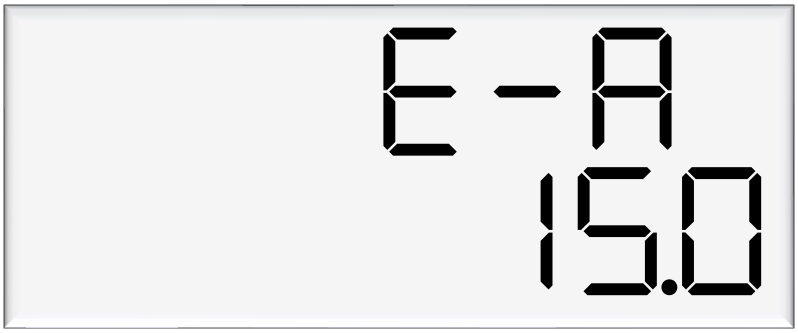
See Using the Dispenser Menus to edit these settings. Use the procedure for both side A and B.

As meter IDs are only relevant for V50 operation, this option will not show if the meter is not set to V50. Therefore, it will not be shown for hoses dispensing diesel.

Changing the Temperature Calibration

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

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

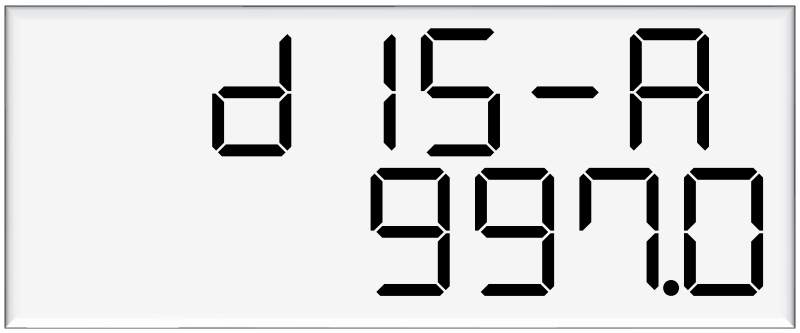


As only V50 meters return temperature readings, this option is only for V50 operation and will not appear if the meter is not set to V50. Therefore, it will not be shown for hoses dispensing diesel.

Changing the Density Calibration

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

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



As only V50 meters return density readings, this option is only for V50 operation and will not appear if the meter is not set to V50. Therefore, it will not be shown for hoses dispensing diesel.

Changing the Maximum Flow

If this setting is left at 0000 the maximum flow, or Qmax, is 40 litres/minute by default. When changing the maximum flow, note that the MMQ and preset rounding are calculated from the maximum flow.

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

Changing the K-Factor

The K-Factor is used to calibrate product flow. It is a ratio of litres dispensed per revolution of the meter. The K-Factor may need to be calibrated after periods of time. To calibrate the pump, dispense fuel into a certified measuring container and compare the display value with the one dispensed. This should be done for both AdBlue and diesel.

Example:

Display shows 10.00 True volume 20.00

To calculate the correct K-Factor from the information above; firstly record the existing K-Factor.

$$New\ K\ Factor = Existing\ K\ Factor * \frac{Dispensed\ Amount}{Displayed\ Amount}$$

$$= Existing\ K\ Factor * \frac{20}{10}$$

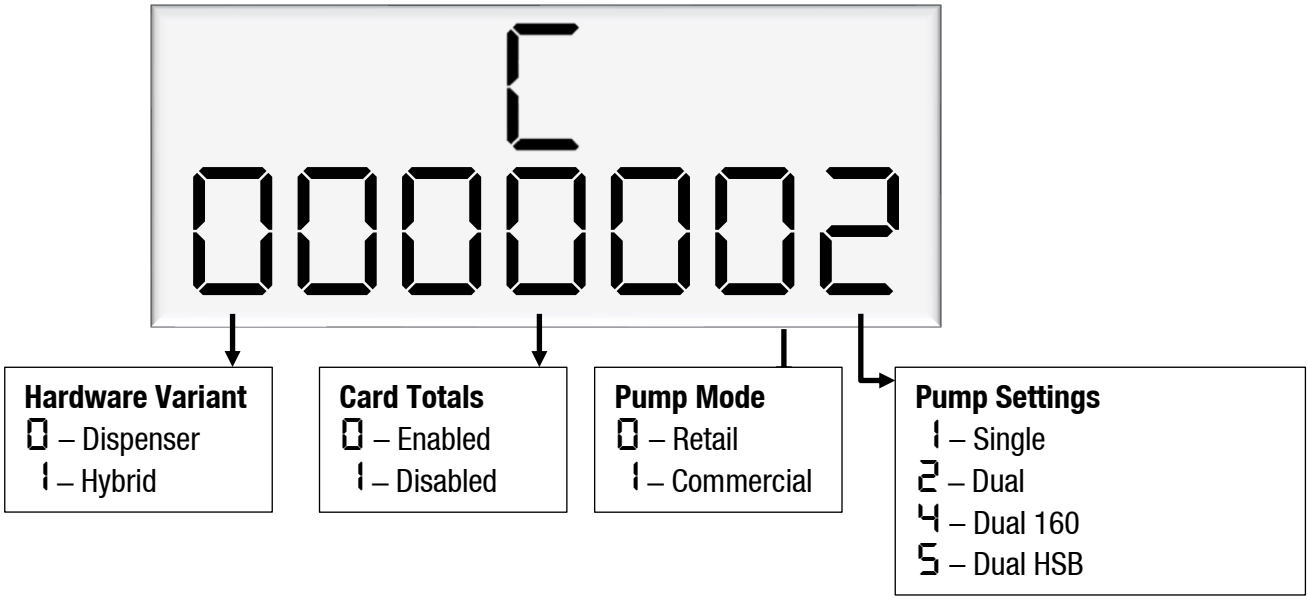
$$= Existing\ K\ Factor * 2$$

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

Changing Configuration Settings

The dispenser has settings for each side (as previously shown) as well as configuration settings for the entire unit.

Use the following diagram to set the unit up as desired.



Hardware Variant

The hardware variant refers to the type of dispenser and should always be set to 0 – Dispenser for dispenser application.

Card Totals

Card totals record the delivery totals for given cards. This is enabled by default but can be disabled if desired.

Pump Mode

The dispenser can be switched between retail or commercial, depending on the application.

Pump Settings

Each setting is a different configuration with different hardware. See below for descriptions of these configurations.

For all pump settings, the main display shows information on side A. Slave displays will need to be configured to show side B.

Main display (K-Factor display)

Single Pump or Dispenser

In single mode, one outlet is used to dispense one product. The price per litre window for side B is not used.

In this setting, only side A settings will appear in the menus.

Dual Pump or Dispenser

In Dual mode, the dispenser or pump has two outlets which can be used separately, at the same time. Each outlet can be configured separately. Two separate products can be used. Side A supports high flow.

Dual 160 Dispenser

In Dual 160 mode, the dispenser has two outlets, however they must dispense the same product. Either outlet can support high flow and both outlets can be used simultaneously.

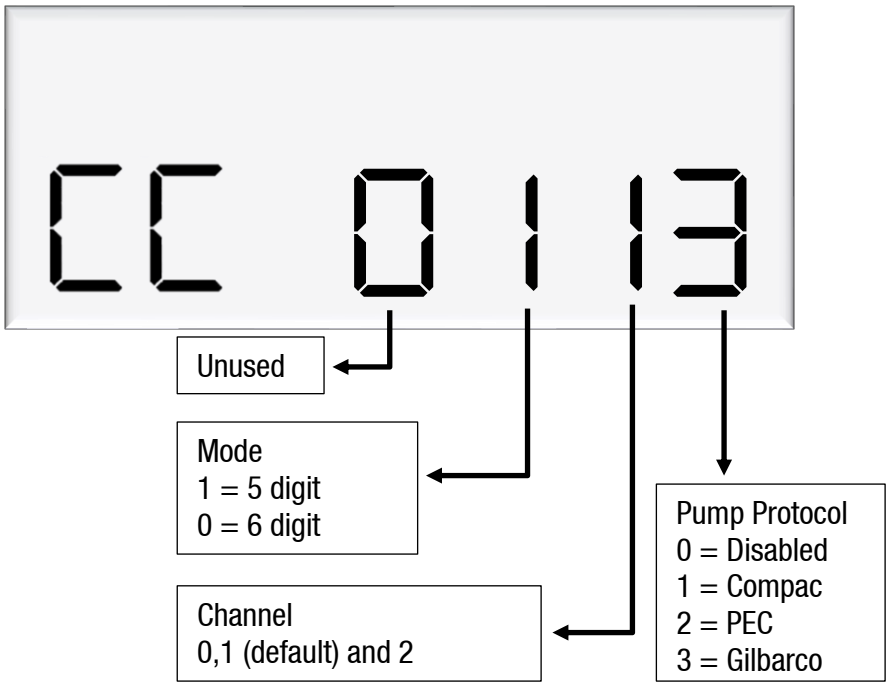
Dual 160 mode can only be used in dispenser application, and not for pump application.

Dual HLB Pump or Dispenser

In Dual HLB mode, the dispenser or pump has two outlets which can be used separately, at the same time. Each outlet can be configured separately. Two separate products can be used. Side B supports high flow.

Changing COMMS

Use the following diagram to setup COMMS as required.



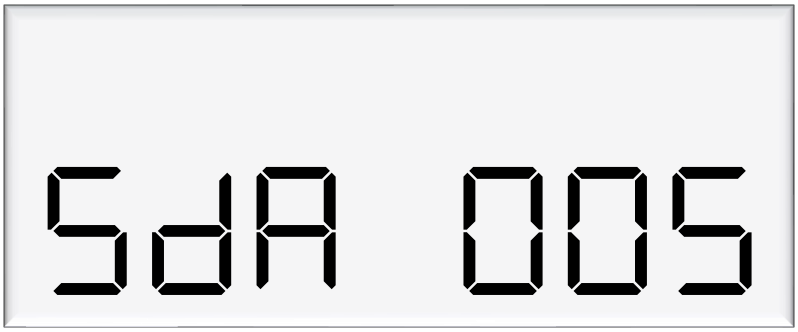
Change the Protocol and the mode to match the controller's settings. Channel 1 is the default channel for dispensers (channel number should always match the with the comms board terminal block used).

E.g. CC = 0113 Gilbarco on Channel 1, 5 Digit mode

Changing the Solenoid Delay

Pumps have two solenoids for product flow. If the solenoids are unavailable, the pump preset should also be unavailable. The solenoid delay is the time between when the motor starts, and when the solenoids start at the beginning of a transaction. The value entered is in seconds.

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



Changing the Preset Cutoff

Preset cutoff is used to deliver an accurate amount of fuel. When dispensing fuel, two solenoids are used for fuel flow. When the dispensed amount of product reaches the preset cutoff, one solenoid is turned off to slow delivery rate and dispense an accurate volume of product.

The entered value should be in litres – for example, if 1.50 is entered, and the preset is 10, the primary solenoid will cut off once 8.5 litres have been dispensed.

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

Changing the Preset Rounding

The dispensed amount of fuel can be rounded to the preset if within the preset rounding parameters. If the preset rounding is left as zero, the preset rounding will be calculated from the MMQ. 1% of the MMQ will be used for preset rounding. For example, if the MMQ is 2L:

$$2\ x\ 0.01 = 0.02$$

Therefore, if the dispensed value is within 0.02L of the preset, it will be rounded to the preset.

A high and low amount can be entered, which will be used to round the preset. The measurement is in litres. For example, if .80 was entered for the low amount, and the preset was 40L:

39.20 is within .80 of 40 and would therefore be rounded up to 40.

If 2.00 was entered for the high amount, and the preset was 40L:

42.00 is within 2 of 40 and would therefore be rounded down to 40.

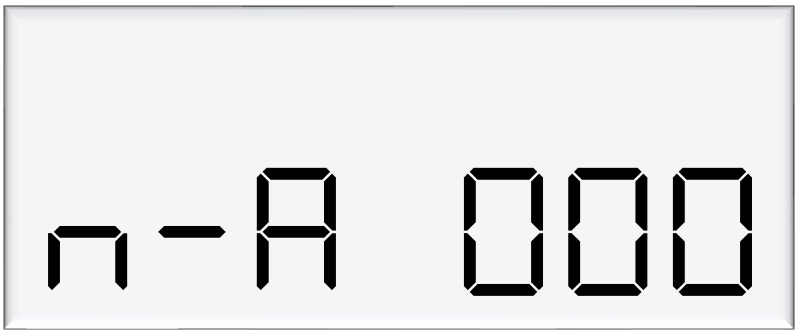
See Using the Dispenser Menus to edit these settings. Use the procedure for both side A and B.

Changing the Flow Time Out

The flow time out is the amount of time it takes for the transaction to time out after flow stops, if the nozzle is not hung up. The default depends on the dispenser mode. The default time out will be 20 seconds.

If a different value is desired, enter this value in the menu below, in seconds. The maximum flow time out is 120 seconds. If a value above 120 seconds is entered, the flow time out will stay as 120 seconds.

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



Parameter Settings

The following table summarises the parameter switch settings. Information on these settings and how to change them can be found on the following pages.

NOTE: *The configuration settings must be set before parameter settings can be accessed.*

Setting	Price Display	Litres Display
Software Version	P******	P******
Pump Number		PnA *** or Pnb ***
Price		PA***** or Pb*****
Pump Settings		bA **** or bb ****
High-flow cut off		HFA ***
Low-flow cut off		LFA ***
b Setting		b ****
Slave display		dS ****
Custom display		dc ****
Last Sale	****	A **** or b ****
Electronic Totes	LA **** or dA **** Lb **** or dA ****	L****** d******

Using the Dispenser Menus

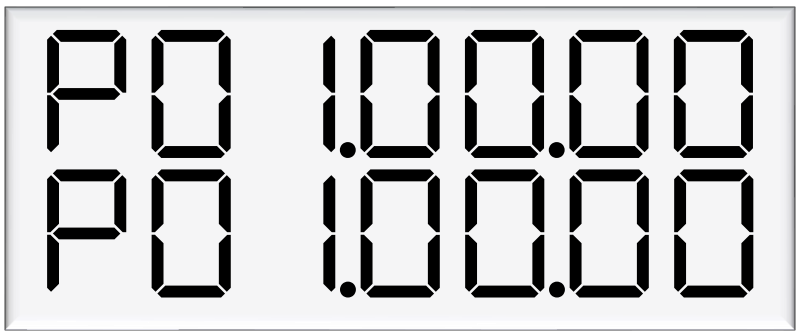
When changing settings on the dispenser, pressing the Parameter switch in quick succession cycles between the options available. The location of this switch can be found on page 6. Each press of the button will cycle between the digits. When going through the menus, each menu will cycle through the digits twice for ease of operation.

When a digit is flashing, hold down the relevant switch to increment this digit. Release the switch on the desired value.

The system timeout is 10 seconds.

How to View the Software Version

Pressing the parameter switch once will show the software version.



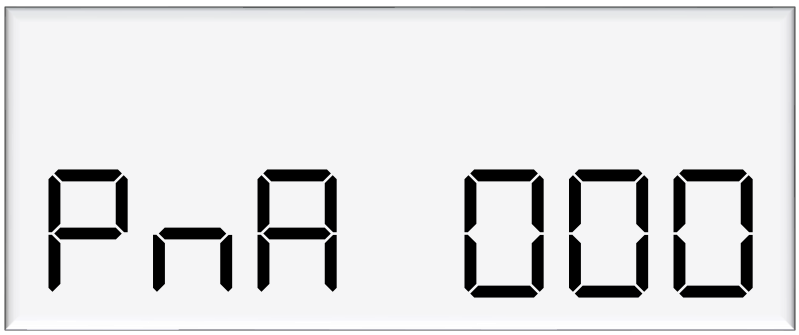
The dispenser will then run through a segment test.

Changing the Pump Number

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

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

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



Changing the Price

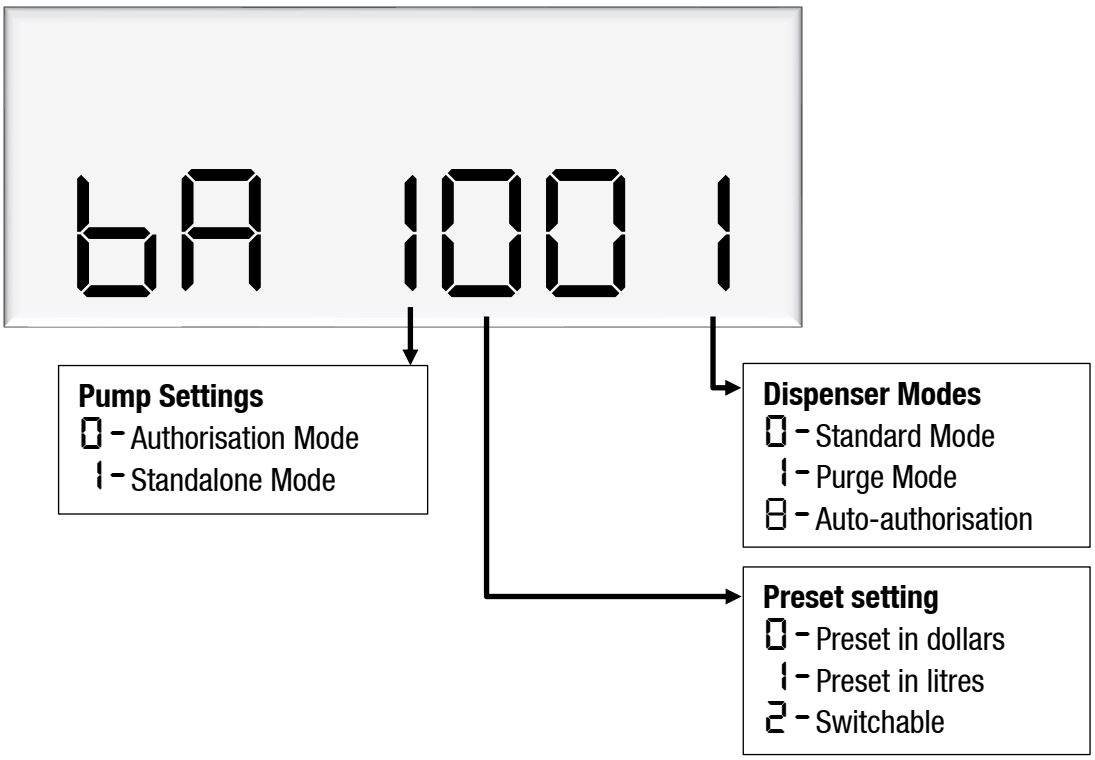
The price must be set before the dispenser can be used, otherwise an error will be returned. Set the price in dollars per litre.

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

Changing the Pump Settings

The pump can have different modes, which can be set using the diagram below. See below for information on these modes.

See Using the Dispenser Menus to edit these settings. Use the procedure for both side A and B. If the dispenser is in multi product mode (see page 15) there are only settings for side A, which will apply to the whole unit.



Standard Mode

In standard mode, the main display will show:

- Top row: Transaction total in dollars
- Second row: Uncompensated litres for non-LPG, dispensed by default, but can be changed in Dispenser Settings

And the unit price window will display the price per litre.

Purge Mode

Purge mode can be used for all calibrated runs with the exception of vapour tests. When in purge mode, the following is displayed on the main display:

- Top row: PurGE
- Second row: Uncompensated litres dispensed

If the meter setting is set to V50 meter, the unit price window will alternate between showing temperature and density at 15 °C. If the density is outside of the compensation range, then the observed density will be displayed. This information is obtained from the V50 meter.

If the meter settings are set to encoder meter, the unit price display will show flowrate.

In purge mode, all display suppression is turned off.

Preset Options

A preset in dollars or litres can be set. Before a transaction, type in a desired preset value. There are three options for setting a preset:

- Dollars – the preset will be shown in the top row of the main display
- Litres – the preset will be shown in the bottom row of the main display
- Switchable – The preset can be switched between dollars and litres by holding '#' for three seconds when not in a transaction.

Presets can still be entered during a transaction, as long as flow has not started. Enter a preset by using the keypad. Pressing # will clear a preset. As soon as flow starts, the preset can not be changed, however, pressing the # key during the transaction will display the preset amount.

Pressing # after a transaction will recall the last preset. This will then be used for the next transaction, if it is displayed when the nozzle is picked up. This is useful for multiple transactions in a row requiring the same preset.

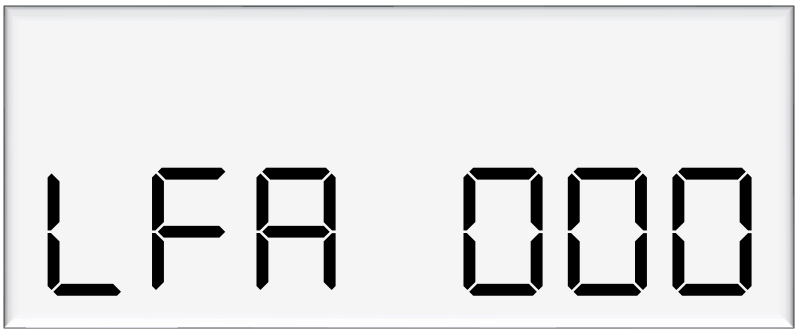
Presets entered must be larger than the MMQ. If the MMQ is large, when entering a preset after lifting the nozzle, the MMQ will automatically show up. Continue entering the desired preset to override this. If entering a preset before lifting the nozzle, and a value below the MMQ is entered, an error code will be returned.

Changing the Low-flow Cutoff

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

The low-flow cutoff will end the transaction (without an error code) if flow drops below this value. The low-flow cutoff only applies if a custom value is entered.

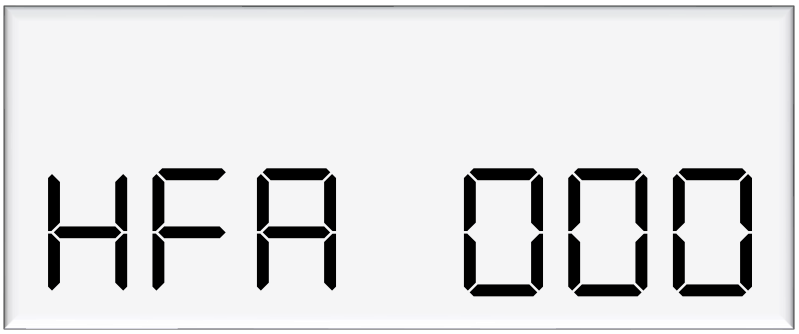
See Using the Dispenser Menus to edit these settings. Use the procedure for both side A and B.



Changing the High-flow Cutoff

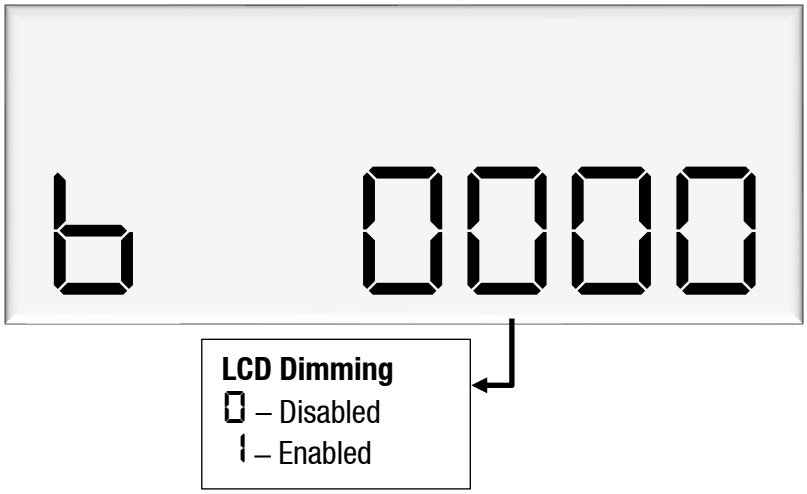
The high-flow cutoff will stop transactions if the flowrate exceeds this value, and will return an error. The high-flow cutoff only applies if a custom value is entered.

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



Changing the b Setting

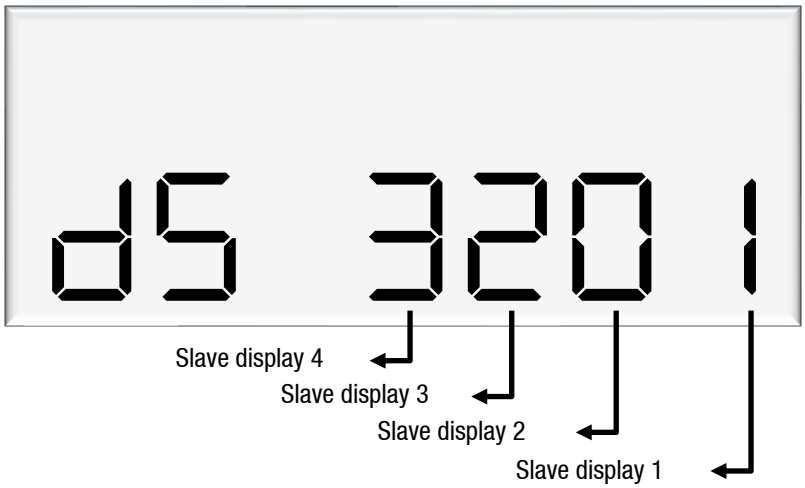
The b setting is currently only used for LCD dimming. Set the b configuration code as desired.



Changing the Slave Display Configuration

Slave displays can be configured as, a clone of the main display, to show side A, or to show side B. Otherwise, it can be disabled. Slave display configuration is a two-step process.

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



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

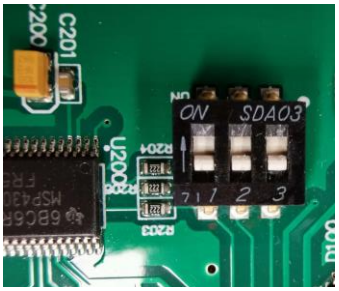
Note: *Each digit can have 4 different values, each value has a different meaning.*

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

Assigning a number to slave display

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

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



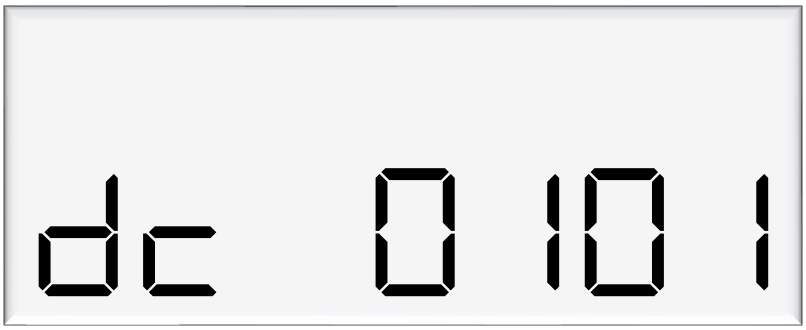
CAUTION : *Make sure the device is powered off before attempting to change the dip switches*

Changing the Custom Display Configuration

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

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

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



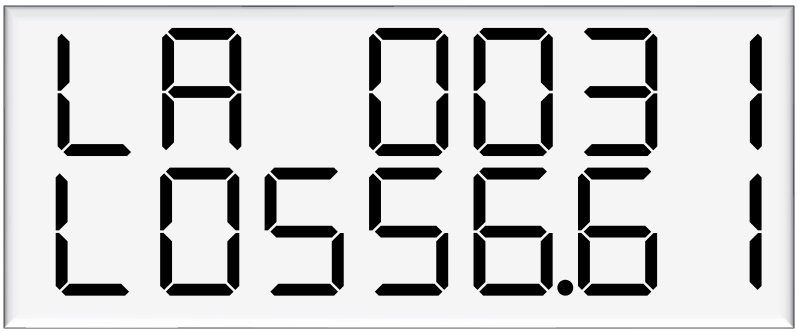
How to View Last Sale

To view the last sale details, continue pressing the parameter switch until the following display is shown. This will only show up if the dispenser is in V50 mode.

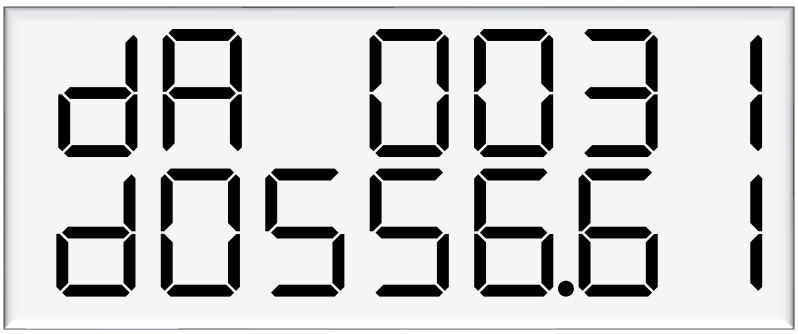
The top row will show uncompensated, unsuppressed quantity dispensed in litres, while the bottom row will show the density reading at 15°C. The unit price display will show the temperature reading at the end of the sale. The left most character of the density reading indicates the nozzle side. There is a reading for side A and B.

How to View Electronic Totes

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



The bottom row is a continuation of the top row – for example, the above display should be read as 003 105566 1. The side (A or B) will be shown in the unit price display. Dollars totals are also recorded, which can be viewed by continually pressing the parameter switch.



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

NOTE: *Electronic totes and mechanical totes are disabled in purge mode.*

Commissioning

Electrical

This procedure outlines how to perform an electrical operational test, 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 fuel has **not** been applied to the dispenser. The factory set-up information should be programmed into the dispenser.

For the location of LEDs, required for this operations test, see page 43.

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 dispenser may be in purge mode. This is okay for the purpose of this test.
3. With the dispenser in a **ready state**, check that the C5000 processor board Power LED is turned on.

NOTE: *If the dispenser is receiving information, RD LED on the K-Factor board will be on. If the dispenser responds to polls for its respective pump number/s, TD LED will also be on.*

4. Lift the nozzle. The display will show PurGE and the solenoids will energise, starting the pump motor. Check that three output LEDs (T1-7) turn on, indicating a signal is being sent to the triacs to open the solenoid valves. The LEDs that will turn on vary depending on the application.
5. The diagnostic LED (K-factor board) 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 the nozzle returned to the holster it will return to the normal state and flash slowly.
6. 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.

Mechanical

Diesel

Make sure that the electrical commissioning tests have been carried out and the solenoid operation has been verified before carrying out the following tests.

Ensure the power supply to the dispenser is turned on, and lift the nozzle. Check all the dispenser fittings, solenoids and pipework for leaks.

Check all bungs have been removed.

Perform test transactions to ensure flow rate is within acceptable ranges and the dispenser is correctly measuring fuel.

If a preset is required, perform test transactions with presets and ensure they are working correctly.

Calibrate the unit with the K-Factor (see page 14.)

AdBlue

Make sure that the electrical commissioning tests have been carried out and the solenoid operation has been verified before carrying out the following tests.

Slowly open the supply valves to the dispenser, checking for any leaks.

Turn on the power supply to the dispenser.

The dispenser should be in purge mode when it arrives onsite. If it is not, use the Parameter button to put the dispenser into purge mode by changing the b setting to *** 1. Retail dispensers will display Purge in the Dollars display. The temperature and measured density will toggle in the $/L display. Wait for the C5000 to time out and return to the normal display.

Lift the nozzle.

The display will show PurGE and the solenoids will energise, starting the pump motor. Check that three output LEDs (T1-7) turn on, indicating a signal is being sent to the triacs to open the solenoid valves. The LEDs that will turn on vary depending on the variant and side being tested.

In Purge mode the dispenser will only operate for 60 seconds at a time before shutting down. If the dispenser shuts down, hang up the nozzle and start again.

Check all the dispenser fittings, solenoids and pipework for leaks.

Slowly dispense AdBlue from the dispenser, being careful to shield yourself from splashes as there may be air in the fuel causing it to spray from the nozzle. If the dispenser stops, hang up the nozzle then remove it and start dispensing again.

Continue until the AdBlue flows without any air being present, then hang up the nozzle.

Put the dispenser back into normal mode by changing the b setting back to ***0.

Lift the nozzle and slowly dispense AdBlue from the dispenser. The display and tote should increment when fuel is flowing. If the dispenser stops and the error message AIR displays, go back and purge the hose again.

The dispenser can now be calibrated.

Once the pump is connected on site, the final setup check and calibration to complete the installation must be carried out, using the Parameter Switch and Calibration (K-Factor) Switches on the C5000 K-Factor board.

Hydraulic System

Component	Function
Manifold	Allows flow of AdBlue into and out of the Meter.
V50 Meter	Meters the flow of AdBlue. Also measures AdBlue density and temperature and detects vapour.
Solenoid	Provides on/off flow control over the AdBlue through the dispenser.

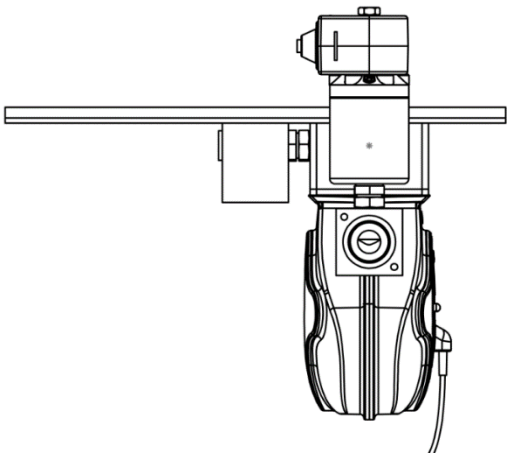
Typical Cycle

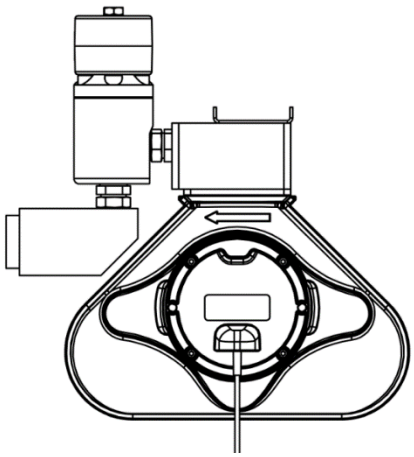
The following describes a typical hydraulic cycle.

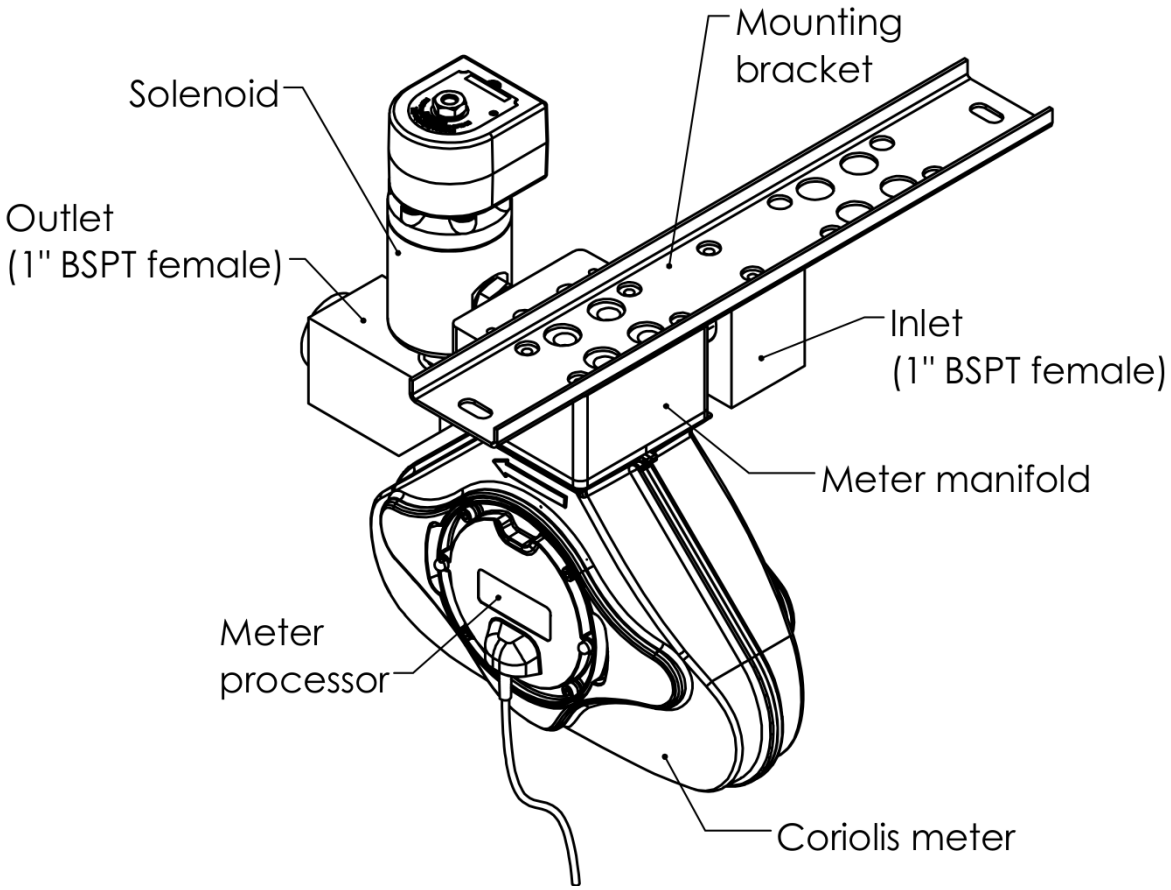
Operator Action	What Happens at the Dispenser
Lift the nozzle	If there is no site controller, the C5000 activates the AdBlue pump and the display shows 88888 as the V50 meter checks the density of the AdBlue. If the density checks out, the display resets, the solenoid opens and the fill commences. If there is a site controller the AdBlue dispenser must be off hold before the nozzle is lifted. The nozzle must be hung up for 3 seconds before lifting and placing in the vehicle.
Nozzle lever opened.	AdBlue flows through the dispenser and is metered.
Nozzle lever closed and nozzle is hung up.	The solenoid closes and pump stops after the fill has ended.

Hydraulic Layout

Single V50







Servicing

Tools

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

- A full set of metric and imperial wrenches
- A 9/16” or 14mm Allen key or hex key
- Long nose pliers
- A multimeter
- An earthing strap

Initial Servicing

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

- Check the system for leaks.
- Check the nozzle for urea crystals
- Make sure the doors are correctly in place and all panels are secure.
- Check the operation.

Annual Servicing

Every twelve months:

- Do a calibration check. Adjust if necessary.
- Check the system for leaks.
- Check the nozzle for urea crystals
- Make sure the doors are correctly in place and all panels are secure.
- Check the condition of the AdBlue Hose. Replace if necessary.
- Check the operation.

V50 Meter Servicing

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

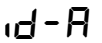
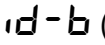
Replacing the Electronic Module

The electronic module can be replaced without draining the dispenser.

- Turn the power off the dispenser.
- Remove the side panel to access the meter.
- Undo the retaining screws on the front of the meter.
- Snip the sealing wires and remove the electronic module from the meter.
- Snip any cable ties and noting where it is plugged in, unplug the module from the C5000 K-Factror board.
- Fit the new electronic module to the meter. Feed the cable up to the C5000 K-Factror board and plug it into the same socket as the old module (the clips face outwards).
- Cable-tie the new cable in place and fix the module in place with screws and new anti-tamper seals.

Pairing the Electronic Module

The new module needs to be paired to the C5000 processor board using the K-Factor switch.

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

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

You will now need to calibrate the new module.

Removing the V50 Meter

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

- Turn off the inlet valve at the base of the dispenser.
- Turn the power off the dispenser.
- Snip any cable ties and noting where it is plugged in; unplug the meter from the C5000 K-Factror board.
- Undo the four screws holding the meter in place and remove the meter.

Replacing the V50 Meter

- Make sure the O rings are in place and ensure the meter is in the correct orientation by checking the 'IN' and 'OUT' labels on the base of the meter.
- Using the four screws, fasten the new meter in place.
- Feed the meter cable up to the C5000 K-Factror board and plug it into the same socket. The clips face outwards.
- Cable-tie the lead neatly out of the way if required.
- Make sure all connections are tight and any drain valves closed.
- Pressurise slowly while checking for leaks.
- Restart the dispenser and pair the new meter to the C5000 unit.
- Calculate and enter the temperature and density offsets and then calibrate the meter.

Calibrating the V50 Meter K-Factor

The calibration factor is a proportional factor of calculated litres dispensed compared to actual litres dispensed. A calibration factor must be set for each meter in the dispenser.

Volumetric Method:

- Place an empty test pail near the dispenser.
- Remove the nozzle from the nozzle holder.
- Wait for the displays on the dispenser to go through its 88888's and return to 0.00.
- Using the nozzle, fill your test pail to the 20L mark.
- Hang up the nozzle.
- Record the litres delivered on the dispenser
- If the calibration is out adjust the K Factor using the following formula: New K Factor = Existing K Factor x Volume dispensed/Volume displayed.

Solenoid Servicing

Replacing Solenoid Seals

Remove Solenoid Valve Seals

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

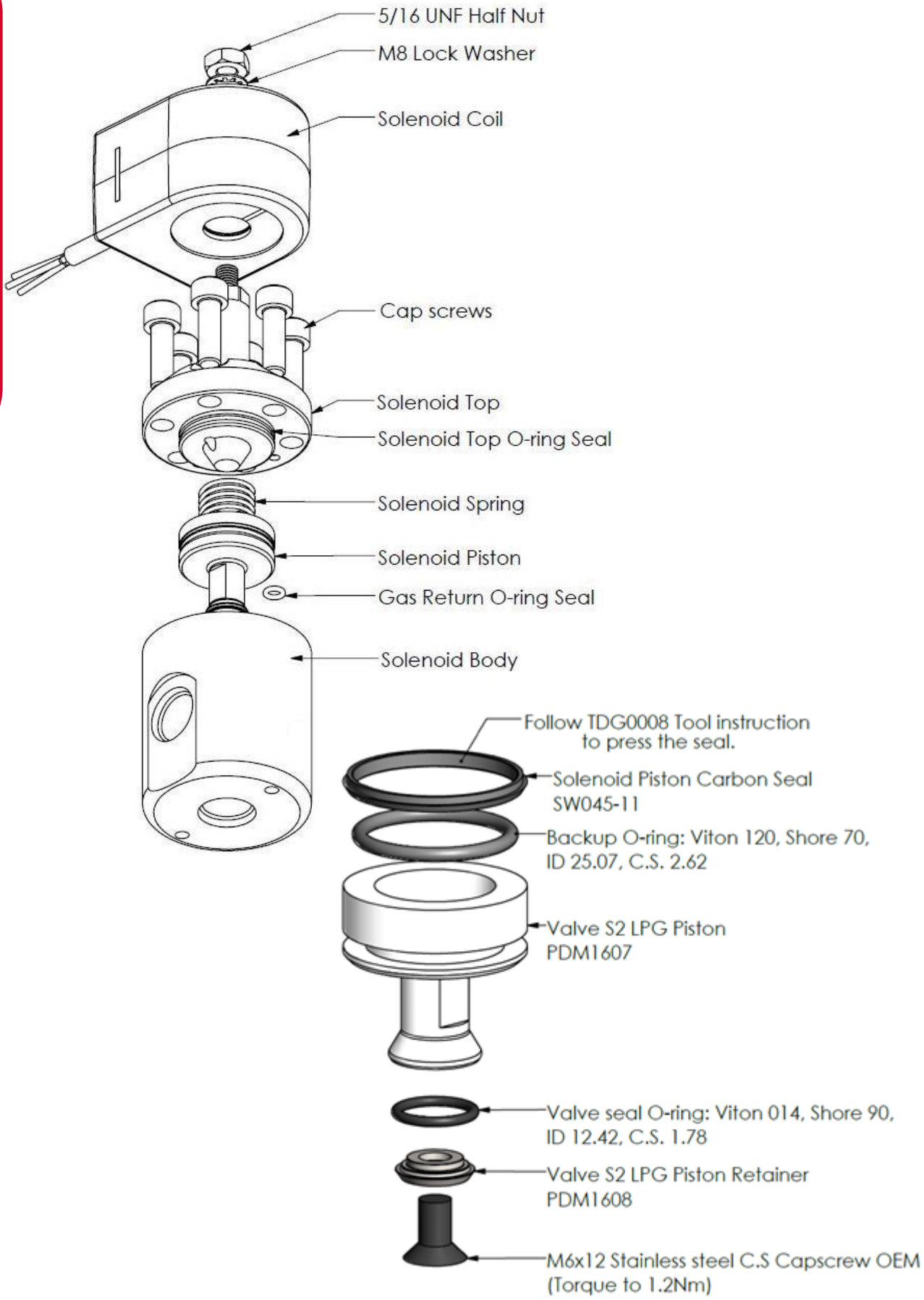
DANGER

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.

Replace 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 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 the dispenser then check for leaks and correct operation of the valve.

Solenoid Valve Diagram



Replacing the Solenoid Coil

- Drain the dispenser
- Switch off and isolate the power supply to the dispenser.
- Remove the flameproof box lid to gain access to the C5000 power supply board.
- Disconnect the appropriate solenoid coil wiring from the C5000 power supply board.
- 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
- Replace with new coil.

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.

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.*

Replacing the Solenoid

- Drain the dispenser.
- Switch off the power supply to the dispenser.
- Undo the nut and remove the solenoid coil.
- Undo the gland nuts connecting the solenoid valve to the pipework and manifold and remove valve
- Ensuring all surfaces are clean and any sealing plugs are removed from the valve, reconnect the pipework to the new solenoid valve and tighten the gland nuts.
- Replace the solenoid coil.
- Repower the unit, check for leaks and test for correct operation.

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.

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.

AdBlue Instructions

Cleaning the AdBlue Nozzle

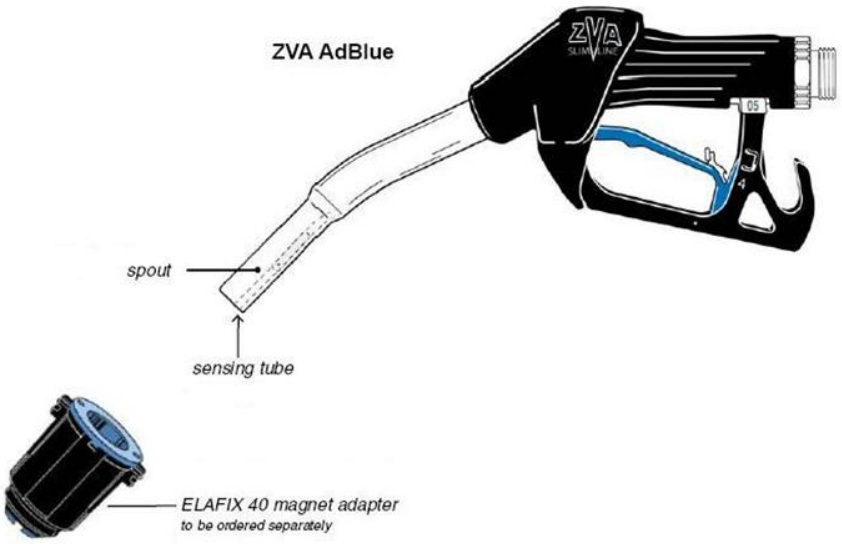
If AdBlue evaporates it may form crystals around the dispenser nozzle. A build up of crystals can block the air passage causing the nozzle to continuously trip off.

If this occurs, rinsing the nozzle in a bucket of warm water will dissolve the crystals and unblock the air passage.

To avoid contamination of the AdBlue, thoroughly dry the nozzle after rinsing.

ZVA AdBlue Nozzle

The ZVA AdBlue nozzle with a magnetic safety catch is commonly used on AdBlue dispensers. The following image is included for reference. For further information refer to ZVA direct.



Automatic nozzle ZVA AdBlue for the refuelling of the “AdBlue” urea solution tanks.

Flow rate up to 40 l/min, working pressure 0.5 – 3.5 bar.

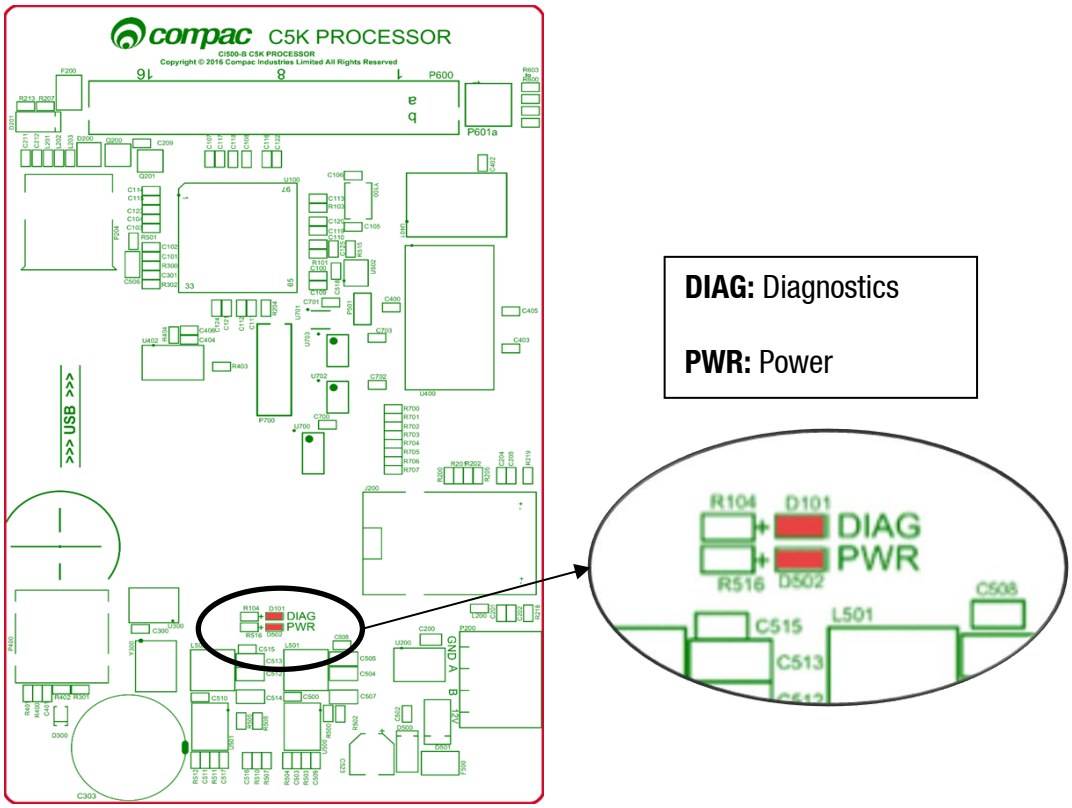
To avoid misfuelling, the standard type of ZVA AdBlue is equipped with a magnet opening in the spout. The nozzle will only open in combination with the magnet adapter ELAFIX 40 which must be installed in the AdBlue filler neck. For the refuelling of other containers or canisters please push an ELAFIX 40 over the spout.

AdBlue tends to crystallise. Due to the evaporation of water, white crystals will show. If these should block the air passage (a sign for this is that the ZVA AdBlue keeps tripping off continuously) this can be solved easily by moving the nozzle spout in a bucket with warm water. In order to avoid contamination, please rinse the nozzle spout with AdBlue previous to the next refuelling.

LED Diagnostics

LEDs on the circuit boards can be used to diagnose faults in the unit. View the LEDs and their corresponding tables to see the state of the board.

Processor Board



Processor Board LEDs	Operation/Possible Cause
Power	This should be on when there is power to the unit.
Diagnostics	This LED shows whether the firmware is running for the board. If it is off, the firmware is not running, and if it is on, it is running. Upon start up this LED will flash, indicating the firmware is loading. The flashing may last up to a minute before it stabilises to being constantly on. If the flashing lasts longer, the board is in bootloader mode – this means that the firmware has crashed, or not loaded correctly.

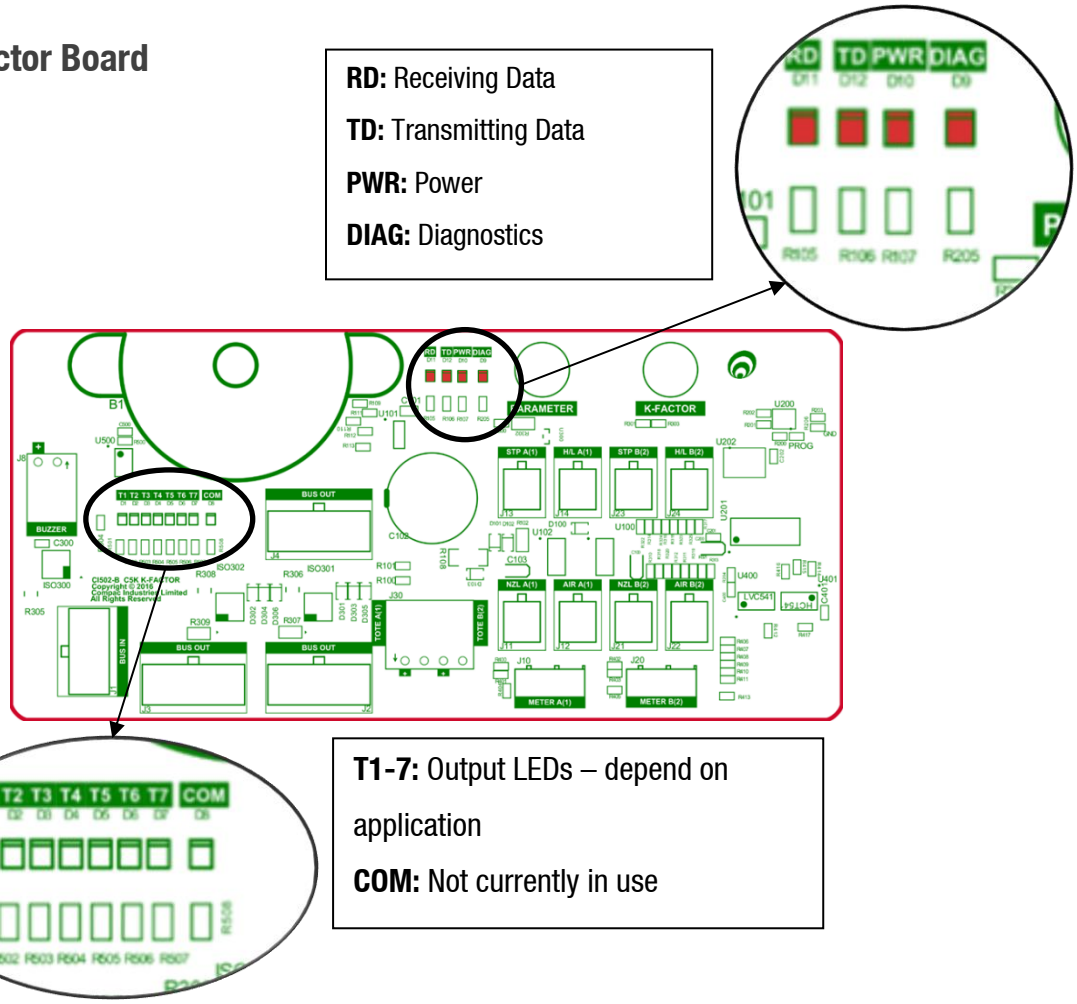
K-Factor Board

RD: Receiving Data

TD: Transmitting Data

PWR: Power

DIAG: Diagnostics



T1-7: Output LEDs – depend on application

COM: Not currently in use

K-Factor Board LEDs	Operation/Possible Cause
Power	This should be on when there is power to the unit.
Diagnostics	In normal operation, this should flash slowly, and then flash quickly when the nozzle switch is lifted.
Triac Output LEDs (T1-7)	These LEDs correspond to side A and B motors and solenoids. They will light up according to the hardware they represent. See the following table for the output LEDs for each application.
Receiving data/ Transmitting data	In normal operation, these should be on when the Diagnostics light is on, and off when the diagnostics light is off. If the diagnostics light is on, and the TD/RD LEDs are off, this means these is an error. This could be due to cabling – check the bus system cables.

K-Factor Board Output LEDs

The following table describes what each output LED represents for each mode. The output LED will light up when the corresponding outlet is engaged. Outputs for both side A and B are shown.

Mode	T1	T2	T3	T4	T5	T6	T7
Single	Motor A	Primary Solenoid A	Secondary Solenoid A	High Flow A			High Flow A
Dual	Motor A	Primary Solenoid A	Secondary Solenoid A	Motor B	Primary Solenoid B	Secondary Solenoid B	High Flow A
Dual 160	Motor A	Primary Solenoid A	Secondary Solenoid A	High Flow B	Primary Solenoid B	Secondary Solenoid B	High Flow A
Dual HLB	Motor A	Primary Solenoid A	Secondary Solenoid A	Motor B	Primary Solenoid B	Secondary Solenoid B	High Flow B

Troubleshooting

Electrical

No Power

- Check power to dispenser/pump unit.
- Check Power LED on processor board.
- Check connections.
- If Power LED is off, check for a short on intrinsic devices by unplugging each device until the Power LED lights up.
- Check Power Supply fuses.
- Replace C5000 if fault not found.

Pump Cuts Out

- Check end of sale indicator in the pump number setting on the parameter switch to determine what ended the fill.
- Check Diagnostics LED on the processor board to see if there is a software issue.
- If Diagnostic LED is off, check that memory chips are firmly in their sockets.
- Replace C5000 if LED is on after repowering unit.

Pump Not Starting

- Check Triac fuse.
- Check all pump motor connections.
- Check pump motor.
- Check wiring.
- Select a spare High Current Solid State Relay if the above checks are okay.
- On the K-Factor board, if the output LEDs are off, check nozzle switch, the nozzle switch is working if the Diagnostic LED flashes faster when switch is on.
- Check Display connection.
- Replace C5000 if fault not found.

Pump Not Stopping

- Check nozzle switches are releasing, the nozzle switches are working if the Diagnostic LED on the K-Factor board flashes faster when switch is on.
- If Output LEDs are off, select a spare High Current Solid State Relay.
- Replace C5000 PCB if fault not found.

Solenoid Not Energising

- Check Triac fuse.
- Check all Solenoid connections.
- Check Solenoid.
- If output LEDs on the K-Factor board are off, check nozzle switch operation, the nozzle switches are working if the Diagnostic LED flashes faster when switch is on.
- Select a spare Low Current Solid State Relay if the above checks are okay.
- Replace C5000 if fault not found.

Solenoid Not De-energising

- If output LEDs on the K-Factor board are on, check nozzle switch is releasing, the nozzle switch is working if the Diagnostic LED flashes faster when switch is on.
- Select spare Low Current Solid State Relay.
- Replace C5000 if fault not found.

Preset Display Digit Flashing

- Check if any preset buttons are stuck in.
- Check wiring & condition of display plugs.
- Replace if fault not found.

PIN Pad Not Working

- Check that the unit is communicating with the controller using the RD/TD LEDs.
- Check connectors are fitted correctly and free of dust.
- Replace if fault not found.

Mechanical

Pre-Set Overrun

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

Calibration Problems

- Check that configuration is correct for calibration method - i.e., temperature compensation on or off.
- Check that filter is not dirty.

Solenoid Valve Not Opening

- Check the output LEDs on the K-Factor board.
- Check the electrical supply to the coil. Check the C5000 output triac is switched on. There should be 220 – 240 volts across the solenoid coil.
- Put power on the solenoid and hold a screwdriver above the coil to feel the magnetic field pull. Because of the construction of the coil a resistance reading cannot be obtained.

Generator Power

The power output from onsite generators can cause power spikes that may damage electrical components within the cabinet.

Although generators are fitted with power regulators, most are not filtered sufficiently for powering sensitive electrical components. We recommend installing a commercial power conditioner and/or UPS between the generator and the unit.

Start Up:

- Before starting a generator, make sure the power to the unit is turned off.
- Start the generator, let the generator reach stable operating speed and wait 30 seconds before reconnecting the power to the unit.

For units where the generator starts and stops on demand, install a delay timer or PLC to automatically isolate the unit until the operating speed and consistent power output is achieved.

Isolate the unit before shutting down the generator.

End of Sale Indicators

The reason for the end of sale for each transaction is recorded by the unit.
These are helpful for troubleshooting the unit.

Keypad Display	Dispenser Display	Meaning
NOZ	1	Nozzle hung up
PRESET	2	Reached preset
DISP	3	Normal end of delivery
OFFLINE	4	Pump – Controller comms disconnected
MAX	5	Maximum litres and/or dollars reached
AIR	6	Air switch cut out
ERROR	7	Encoder error
SUMP	9	Sump switch cut out
TO ATH	12	Auth timeout
POR	13	Fill ended due to repower or reset
STP SW	14	Stop switch triggered
PRST ERR	15	Invalid preset value entered
DIS OFF	17	K-factor offline or unpaired
DIS PAIR	18	K-factor offline or unpaired
FMS TEM	30	Controller initiated stop
DENSITY	35	Density out of range
TEMP	36	Temperature out of range
MTR ERR	41	Meter error
EXC FLO	43	Meter excess flow
UNKNOWN	0	

Spare Parts

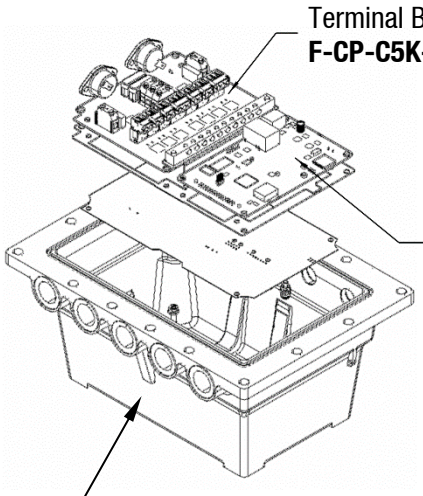
External Himast complete, with brackets and bolts for mounting
F-HIMAST-W/B

7 digit display with plastic enclosure, excludes rear cover
F-CP-DSPLY-7D1PA

Electromagnetic tote with short fly lead (200mm)
F-BA-TOTE-A-K

ZVA AdBlue nozzle
F-NOZL-ADB-MAG

V50 AdBlue meter complete
F-D-MTR-V50AB



Terminal Board:
F-CP-C5K-TERM

Processor Board:
F-CP-C5K-PROCES

C5000 Power Supply:
F-CP-C5K-PS

F-CP-C5K-DSPRMC
7 Digit Display with vinyl overlay for "**COMMERCIAL**" Remote Display Assemblies. (Excludes Front Display Mounting Plate)

F-CP-C5K-DSPRMR
7 Digit Display with vinyl overlay for "**RETAIL**" Remote Display Assemblies. (Excludes Front Display Mounting Plate)

Error Codes

The unit will have error codes programmed in. The following is a list of error codes and how to rectify these errors.

Error Code	Fault	Action/Information
Er FLo	Excess flow	Maximum flow rate exceeded
Er dEn	Density out of range	Calibrate meter density using the K-Factor switch
	Temperature out of range	Calibrate meter temperature using the K-Factor switch
Er PrSt	The preset entered is below the MMQ	Enter a preset above (or equal to) the MMQ
Er 3	No price	Set the price
Er 8	Reverse flow.	Check product is not flowing back into the tank once the delivery has finished. This only occurs if the non-return valves installed on site are faulty
Er 10	Configuration lost	Reconfigure the unit
Er 13	Slave display restarted	Power Failure, hardware failure
Er 14	K-Factor board offline	Check the connecting bus cable
Er 15	K-Factor board restarted	Power Failure, hardware failure
Er31	Transaction ended but fuel is still flowing	Solenoid leaking
Er41	Pump comms lost	Check the connecting wire connections to the comms boards from the pump side and from the controller side.
Er 50	Meter communication error	Check that the meter is connected correctly. Check correct configuration and correct software installed. Ensure the meter IDs on the dispenser software and V50 meter match
Er 52	Meter error	If the problem persists, repower the unit. Replace the meter if necessary

Er 53	Meter stopped vibrating	If the problem persists, repower the unit. Replace the meter if necessary
Er 54	Temperature sensor failure	If the problem persists, repower the unit. Replace the meter if necessary
Er 55	Meter not ready	Wait for meter to calibrate. If the problem persists, repower the unit
Er61	V50 meter could not set it's zero point	Try restarting the meter. If the problem persists, Replace the meter.
Er62	V50 meter could not reset the batch (Could not zero the transaction values when nozzle was lifted to start a new transaction)	Try restarting the meter. If the problem persists, Replace the meter.
Er71	V50 meter is set but variant is not selected	Please select DEF or LPG to get rid of this error
Abd	Slave display offline	Check connections to display Check the slave board configurations
hoLd	Processor offline / no power to processor	This will occur upon start up – allow time for the processor to load. If the problem persists, check connections to processor
cAL ib c	K-Factor data integrity failure, or the processor board has been replaced	The K-Factor seal must be broken, and the switch must be pressed
cAL ib P	The K-Factor board has been swapped/replaced	The K-Factor seal must be broken, and the switch must be pressed
cAL ib	The unit needs calibration, usually due to a hardware change	Check the K-Factor and temperature and density calibrations
cAL ibF	K-Factor is not set or is 00.0000	Set the K-Factor. Calibrate meter
A ir	May suggest air is in the system. May be density out of range, or coil amplitude too low while meter is operating, displayed until next sale is started	Make sure pump is running. Check tank and pipework for leaks. Purge system. Increase the Solenoid delay on the K-Factor switch
orun	Overrun – flow above preset	Increase the preset cutoff
SuMP	Sump error – liquid detected in the sump	Empty the sump. Check the dispenser for leaks