LIQUID FUEL DISPENSER & PUMP SERVICE MANUAL

Liquid Fuel Dispenser & Pump Service Manual

Version 1.0.4

Date: Thursday 14th November 2019

Models:

LASER: L40, L80, LL40-80, LL40, LL80, LLA30-80, L160-80, L160, L400, LL160, LLA30-160
MASTER: MA30, MMA30-80, MMA30, MMR40, MMR80-40, MMR80, MR40, MR80, MMA30-160, MMR160-40, MMR160-80, MMR160, MMR400-160, MMR400-80, MR160, MR400

compac
INTEGRATED REFUELLING SOLUTIONS

CONDITIONS

Conditions of Use

- Read this manual completely before working on, or making adjustments to, the Compac equipment
- Compac Industries Limited accepts no liability for personal injury or property damage resulting from working on or adjusting the equipment incorrectly or without authorisation.
- Along with any warnings, instructions, and procedures in this manual, you should also observe any other common sense procedures that are generally applicable to equipment of this type.
- Failure to comply with any warnings, instructions, procedures, or any other common sense procedures may result in injury, equipment damage, property damage, or poor performance of the Compac equipment
- The major hazard involved with operating the Compac C4000 processor is electrical shock. This hazard can be avoided if you adhere to the procedures in this manual and exercise all due care.
- Compac Industries Limited accepts no liability for direct, indirect, incidental, special, or consequential damages resulting from failure to follow any warnings, instructions, and procedures in this manual, or any other common sense procedures generally applicable to equipment of this type. The foregoing limitation extends to damages to person or property caused by the Compac C4000 processor, or damages resulting from the inability to use the Compac C4000 processor, including loss of profits, loss of products, loss of power supply, the cost of arranging an alternative power supply, and loss of time, whether incurred by the user or their employees, the installer, the commissioner, a service technician, or any third party.
- Compac Industries Limited reserves the right to change the specifications of its products or the information in this manual without necessarily notifying its users.
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- Compac Industries Limited has made every effort to explain all servicing procedures, warnings, and safety precautions as clearly and completely as possible. However, due to the range of operating environments, it is not possible to anticipate every issue that may arise. This manual is intended to provide general guidance. For specific guidance and technical support, contact your authorised Compac supplier, using the contact details in the Product Identification section.
- Only parts supplied by or approved by Compac may be used and no unauthorised modifications to the hardware of software may be made. The use of non-approved parts or modifications will void all warranties and approvals. The use of non-approved parts or modifications may also constitute a safety hazard.
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SYSTEM CERTIFICATION
ISO 9001
SGS

Product Identification

Specifications	
Manual Title	Liquid Fuel Dispenser & Pump Service Manual
Original Publication Date	22 September 2016
Models Covered	This manual applies to Compac Liquid Fuel Pumps & Dispensers of the following models: LASER: L40, L80, LL40-80, LL40, LL80, LLA30-80, L160-80, L160, L400, LL160, LLA30-160 MASTER: MA30, MMA30-80, MMA30, MMR40, MMR80-40, MMR80, MR40, MR80, MMA30-160, MMR160-40, MMR160-80, MMR160, MMR400-160, MMR400-80, MR160, MR400 ***NOTE:*** *Do not use this manual for earlier models. Contact Compac for archived manuals if required.*

Validity

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

Manufactured By:

The Compac Liquid Fuel Dispenser & Pump are designed and manufactured by Compac Industries Limited
52 Walls Road, Penrose, Auckland 1061, New Zealand
P.O. Box 12-417, Penrose, Auckland 1641, New Zealand
Phone: + 64 9 579 2094
Fax: + 64 9 579 0635

Email: techsupport@compac.co.nz
www.compac.biz
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1.0.1	04/12/2018	R Liu	Updated website address, Configuration Code Outputs, COMS protocols, Parameter Settings, Power Terminal 7 Function and Error Messages, added compensation hydraulics and rearranged inlets
1.0.2	27/02/2019	S Laycock	Updated Communications Protocol
1.0.3	26/06/2019	S Laycock	J Cable Connections added
1.0.4	14/11/2019	V Amarakoon	Updated error codes

SYSTEM CERTIFICATION ISO 9001 SGS

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Safety

PRECAUTIONS

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

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

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

Electrical Safety

Observe the following electrical precautions:

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

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

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

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

Site Safety

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.

Installation

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

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

Introduction to the Compac Liquid Fuel Dispenser & Pump

The Compac dispenser is designed for safe, easy and trouble free dispensing of liquid fuel. It is fitted with a Compac rotary meter for accurate and reliable measuring of dispensed liquid. It is controlled by the Compac C4000 processor which monitors all operating parameters to ensure correct metering and pricing. A Compac Pump is operationally equivalent to a Compac dispenser with the exception that it has an internal suction pump rather than relying on an external site pump. This manual will use the term dispenser to refer to both Compac dispensers and pumps, unless otherwise specified. In general, the term liquid fuel refers to hydrocarbons, that is, petrol and diesel.

Operating Parameters

Compac liquid fuel dispensers are designed to meter petrol and diesel under the following conditions:

- The liquid pressure range is from 0.5 - 20mPa
- The liquid temperature range is from –10°C to +50°C
- Flow rate of 4 to 400 litres/min

Approvals

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

Principals of Operation

Liquid fuel is pumped from a tank either by a suction pump or external pump. The fuel then passes through a filter, through a rotary meter and out through the nozzle. The meter output is read by the C4000 and converted into litres and price, and sent to the display and site controller.

Software Logic

The C4000 begins a transaction when both authorisation is received from the site controller and the nozzle switch is open. The C4000 tests the display, which shows “888888” for about 1 second, and then activates the motor relay starting the fuel pump. The dispenser then waits the solenoid delay period (default 0 seconds) and then opens the solenoid(s). If there is no site controller the nozzle switch alone begins the transaction, and if the dispenser is set to auto-authorise the controller begins the transaction.

If a preset is fitted, the C4000 will put the solenoid in low-flow mode when the p-cut is reached to prevent overshooting the preset amount. If there are 2 solenoids, such as in 160lpm models, one solenoid will shut off and the other go into low-flow mode when the p-cut is reached. In 400lpm models, the main high flow solenoid will shut off 60 litres before the preset, and the preset solenoid will go into low-flow at the p-cut.

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

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

Whichever event happens first will terminate the sale.

Dispenser Totals

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

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

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

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

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

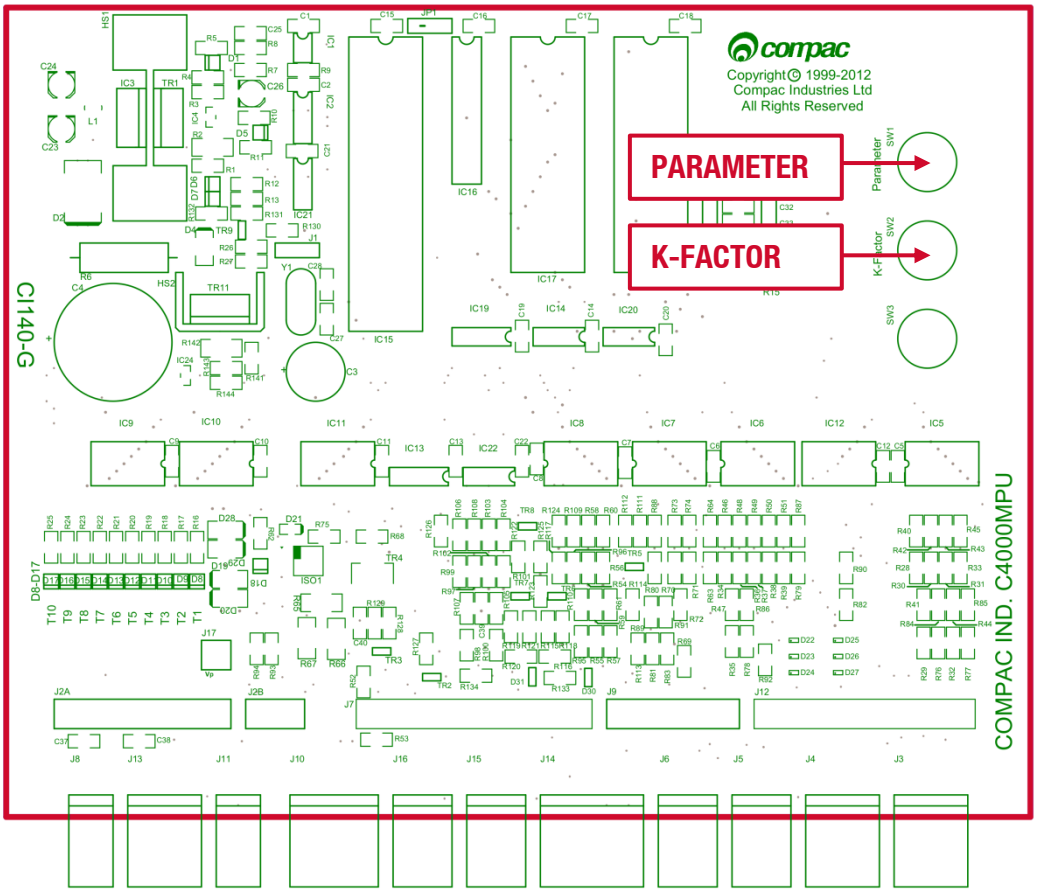
Electronics

C4000 Processor

The Compac C4000 is a microprocessor-based circuit board designed for use in liquid and gaseous fuel metering. The C4000 accepts inputs from the meter. It converts the meter output to litres and displays litres with the price and total of the sale on the retail LCD display.

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

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



K-Factor Settings

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

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

Setting	Price Display	Litres Display
Temperature	E	***.*
Display Resolution	Sr	Sr*.**
No-Flow Cut-Off	n	n***
b Configuration	b	b****
Solenoid Delay	Sd	d***
Preset Cut-Off	Pcut	Pc***
K Factor	F/Fb/F 1/ F2/F3	*****
Configuration Code	c	*****

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

The K-Factor switch must be resealed after use to prevent tampering, and for weights and measures approvals.

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

Display Resolution

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

Solenoid Delay

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

This setting should never be set more than 4-6 seconds and the default setting is 5 seconds.

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

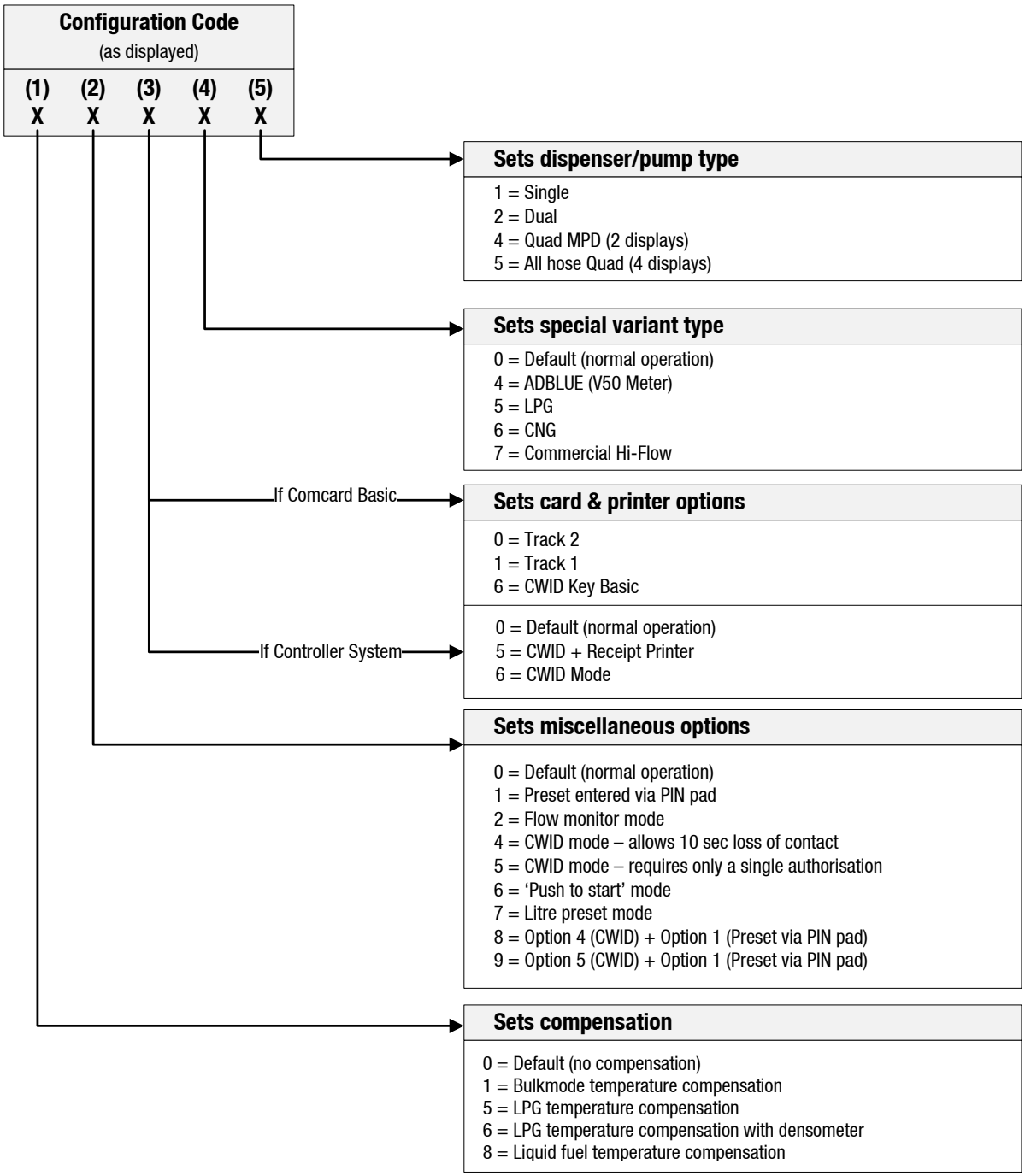
K Factor

Adjusts the calibration factor of the meter. This allows the meter to correctly measure the volume of fuel flowing through it.

NOTE: *pressing the K-Factor switch once will display the current K-Factor.*

Configuration Code

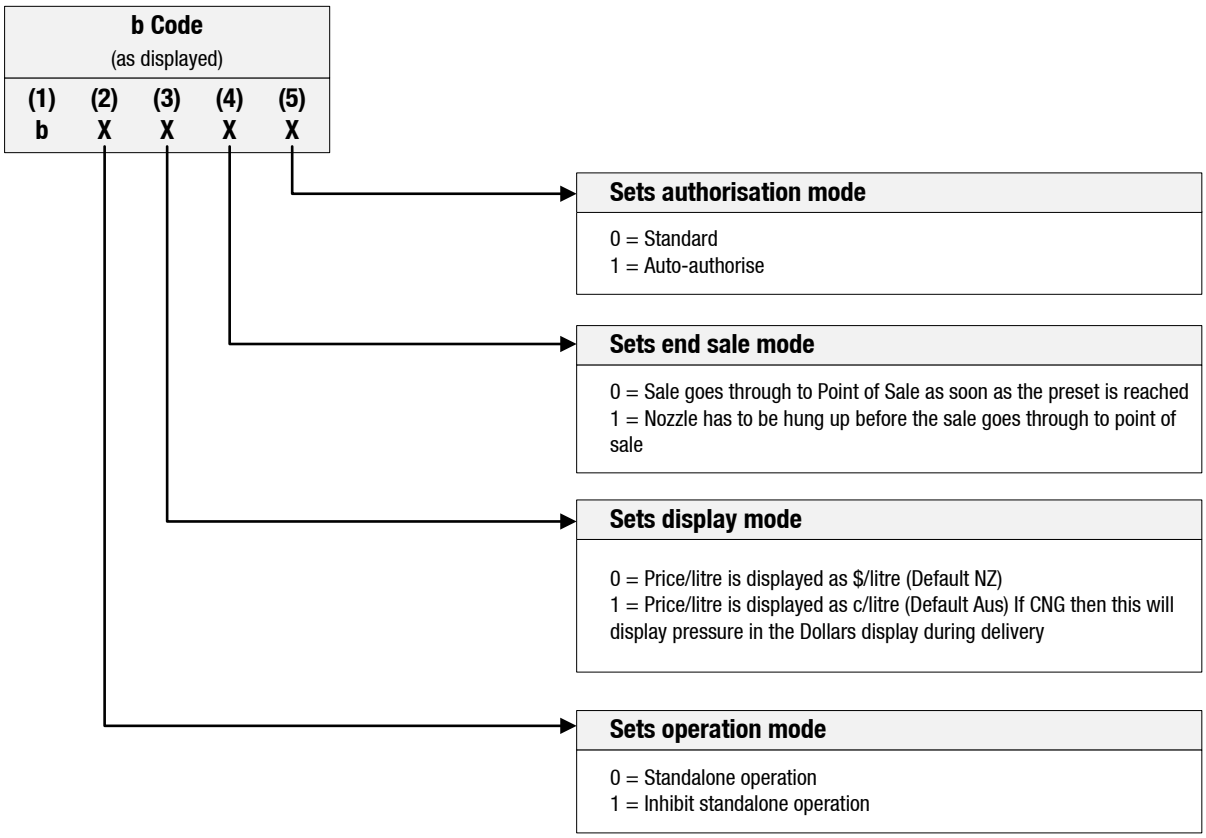
Changes the software for the number of hoses and fuel type. If changing a C4000 processor board this must be set first. The diagram below shows possible configurations.



b Configuration

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

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



Authorisation Mode

Auto-authorise is used when there is no nozzle-holder switch. The switch is bridged on the C4000, and auto-authorise mode (*** ¦) turns on the pump when authorisation is received, without waiting for the nozzle switch. This is a common setup when there is an external hose-reel connected to the dispenser. The transaction is only ended when the no-flow cut-off time is reached.

End Sale Mode

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

Display Mode

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

Operation Mode

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

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

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

Parameter Settings

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

When the Parameter switch is pressed repeatedly, the C4000 will display the Pump Number setting. When the Parameter switch is held, the C4000 will display the Price setting. Pressing the Parameter switch will scroll through the digits of the settings.

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

Setting	Price Display	Litres Display	Unit Price Display
Price	Pr-*/Pr	P****	
Uncompensated Volume for Last Sale	****.**	***.**	Temperature
Density	dEn	***.*	
Pump Number	Pn	PnA**	Last End Sale

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

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

Price

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

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

Pump Number

This must be set at the dispenser for each hose for communications with a controller to take place.

In the Pump Number setting the end of sale indicator is displayed in the unit/price display.

NOTE: *PnA** is the pump number for Side A, and Pnb** is the number for Side B.*

Authorisation Systems

The following systems allow the customer to authorise the transaction from the dispenser/pump or DCA, without having to access the site controller. The site controller will automatically authorise the dispenser/pump after receiving conformation from an authorisation system.

NOTE: *a Compac Site Controller is necessary to run any of the following authorisation systems.*

CWID

The Compac Wireless Identifier (CWID) uses an aerial attached to the dispenser/pump nozzle to communicate with an RFID tag mounted near the inlet of the authorised vehicle's fuel tank. The transaction will be authorised when the aerial gets close enough to the RFID i.e. the nozzle is inserted into the fuel tank.

CWID Key

Qualitatively the CWID Key system is similar to the CWID system, except that the aerial is mounted on the dispenser/pump or an onsite DCA, instead of on the nozzle. To authorise the transaction the customer must carry an RFID tag, and place it against the CWID aerial.

HID Reader

The HID Reader is a third party authorisation system, which, like the CWID key, uses a customer carried RFID tag to authorise the transaction. Unlike CWID Key, HID is not approved for use in hazardous environments so can only be mounted on a DCA or diesel dispenser/pump.

Card Reader

To authorise a transaction using the Card Reader system, the customer must swipe a magstrip card through the reader. This reader can be mounted on the dispenser/pump or on a DCA.

PIN Code

When a dispenser/pump is set up for PIN code authorisation, the customer must enter a PIN, either at the dispenser/pump or at a DCA to authorise the transaction.

Diagnostics

Indicator LEDs

Power LED

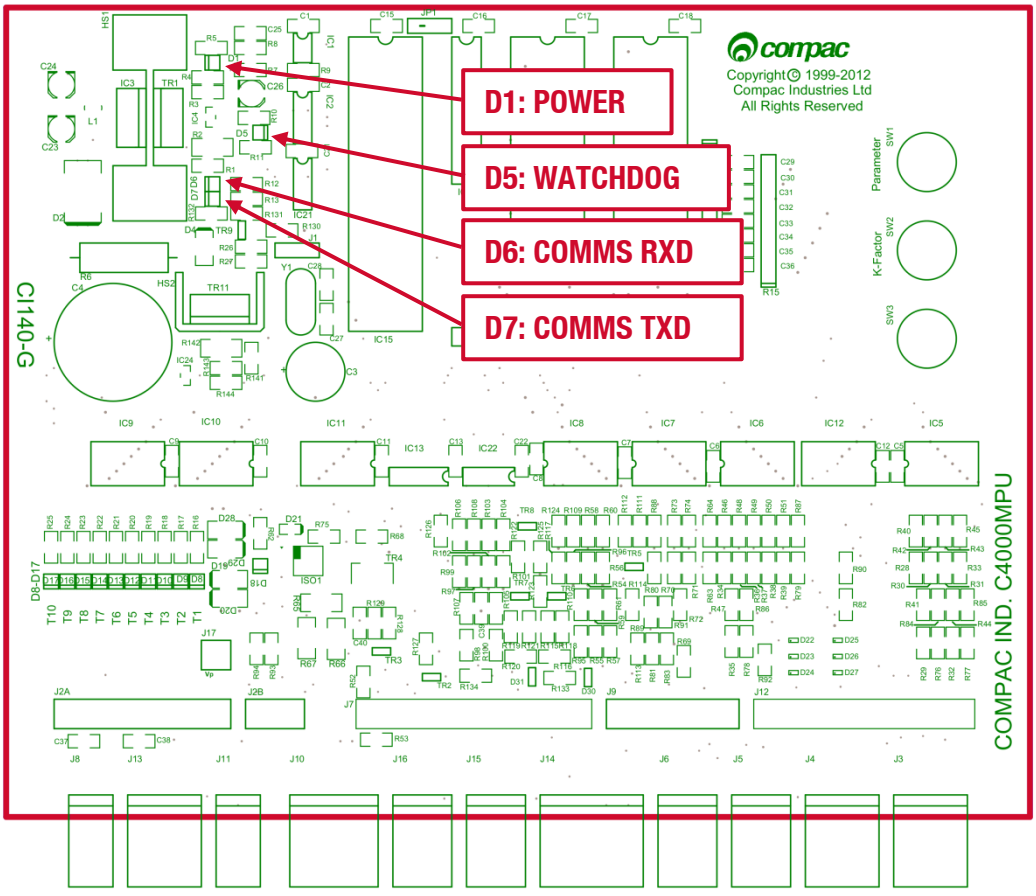
The Power LED lights when the processor board has power. If this LED flashes, this indicates that the processor has a fault on the processor power supply.

Watchdog LED

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

TXD & RXD LEDs

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



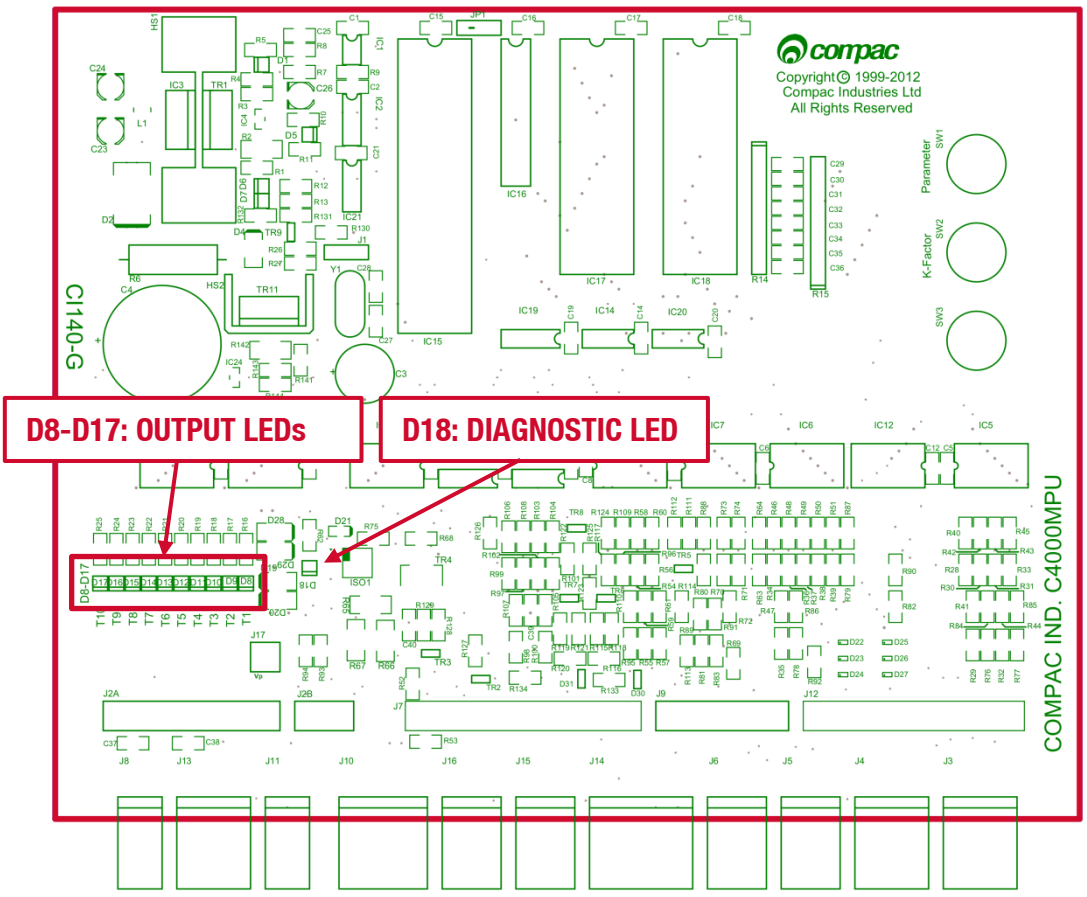
Output LEDs

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

Diagnostic LED

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

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



Hydraulic System

Hydraulic Cycle

On pump models liquid fuel is sucked up from the inlet into the suction pump, pushed upwards into the rotary COM meter where it is measured, and then pushed through a solenoid to the outlet. The solenoid controls the flow of fuel by opening and closing, and where a preset is fitted, switching from high to low-flow mode.

On a dispenser, liquid fuel is forced upwards through the inlet, through a strainer/filter, and then out through the meter, solenoid and outlet.

Below are the layout diagrams for our generic pumps and dispensers.

Hydraulic Components

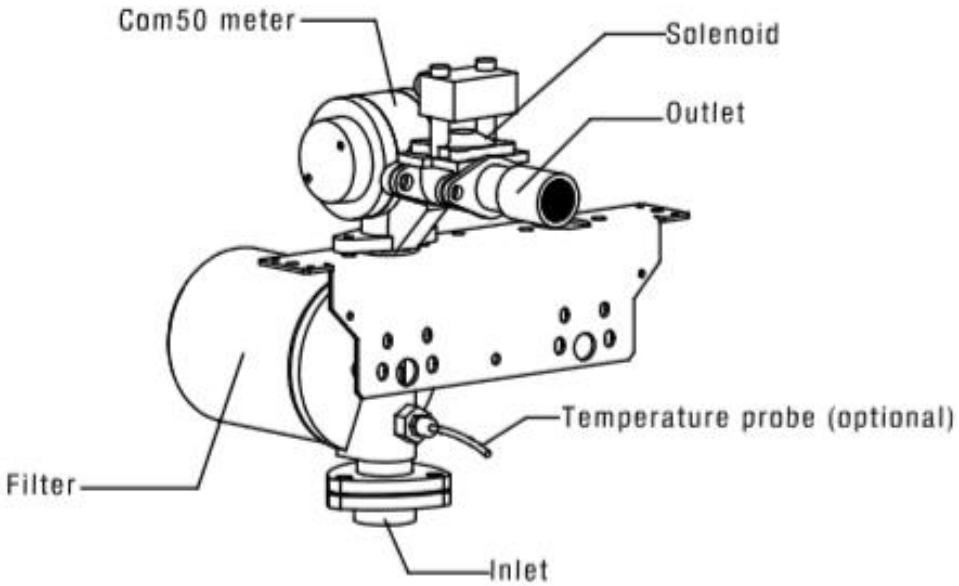
Component	Function
COM50/125/250 Meter	Rotary meter designed to measure the flow of liquid fuel through it.
Filter/Strainer	Stainless steel mesh strainer, or filter to remove debris before the solenoid valve.
Solenoid	Provides on/off and flow control over fuel through the dispenser.
Breakaway	Fitted to the hose to allow a vehicle to accidentally drive off with the hose still attached to the vehicle without damaging the dispenser.

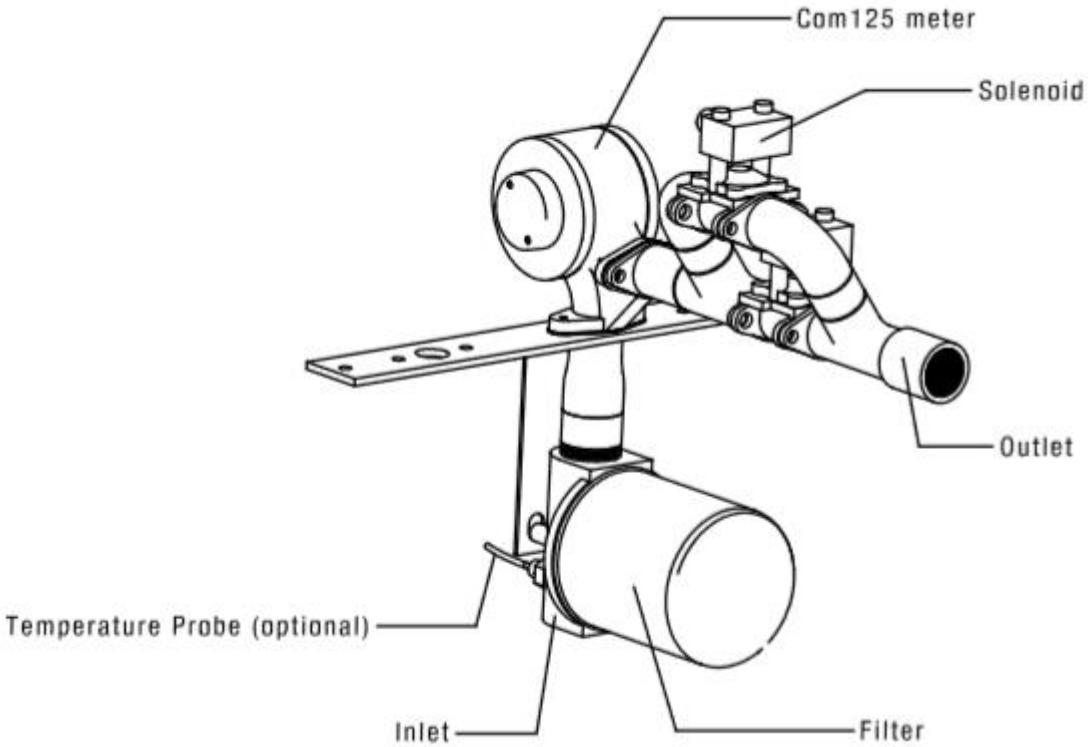
Safety Features

Situation	Feature	Description
Drive away with the nozzle attached to the vehicle.	Inline Breakaway	The Breakaway separates and the vehicle drives away with some of the hose attached to the vehicle. Flow is stopped from both ends of the hose. The Breakaway can be reassembled without tools.
The nozzle switch is left open while there is no flow.	No flow time out of 30 seconds.	The solenoids and pump motor are turned off after the stated time. This is settable from 0-254 seconds at commissioning. It is normally set to 30 seconds.

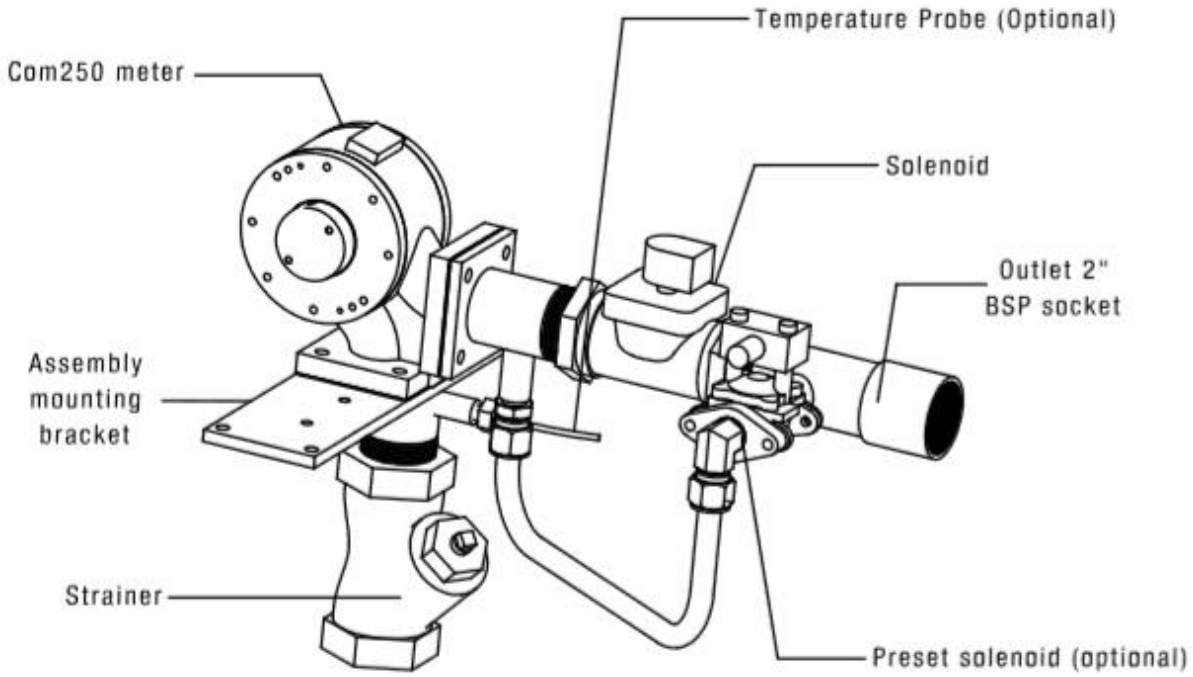
Hydraulic Layout

Single Dispenser

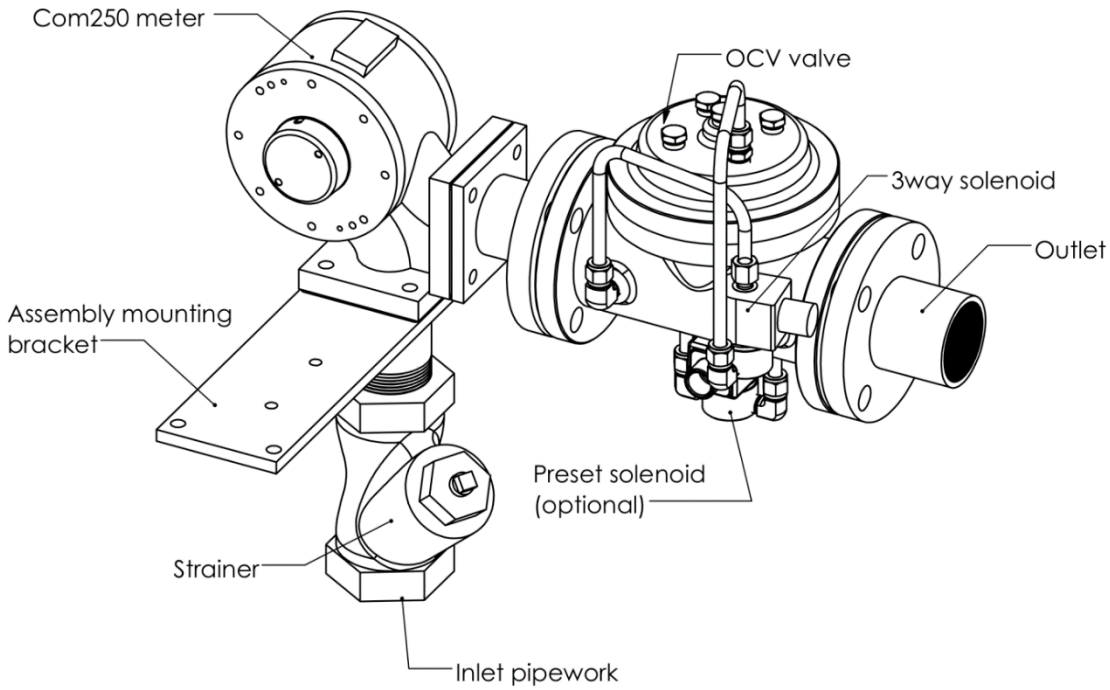




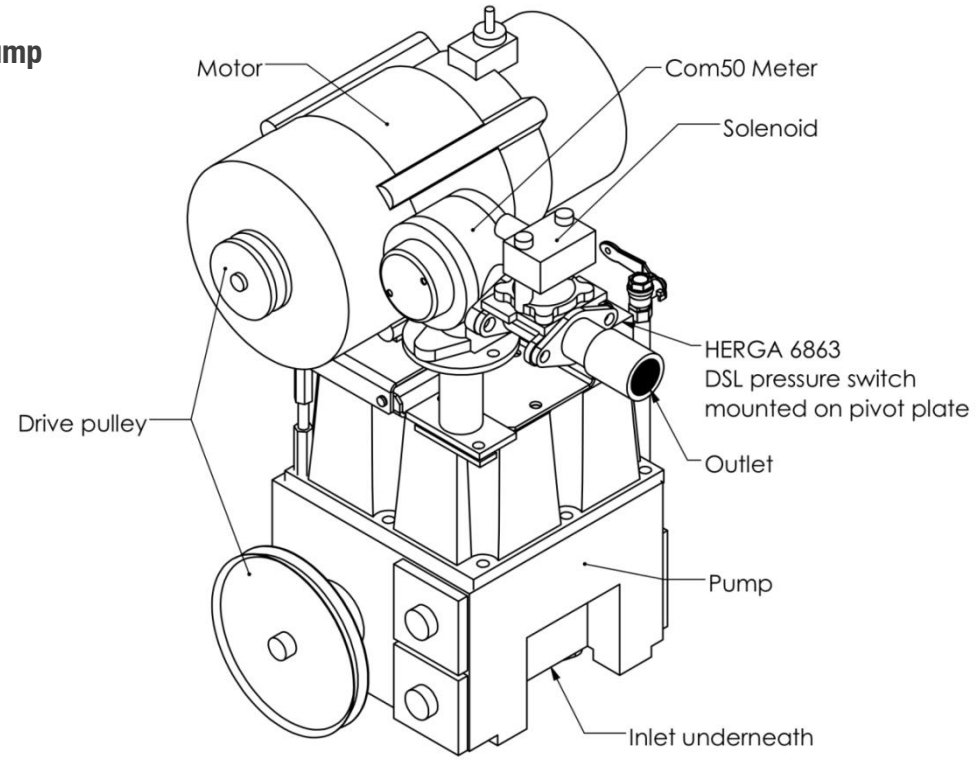
Single High Flowrate Dispenser

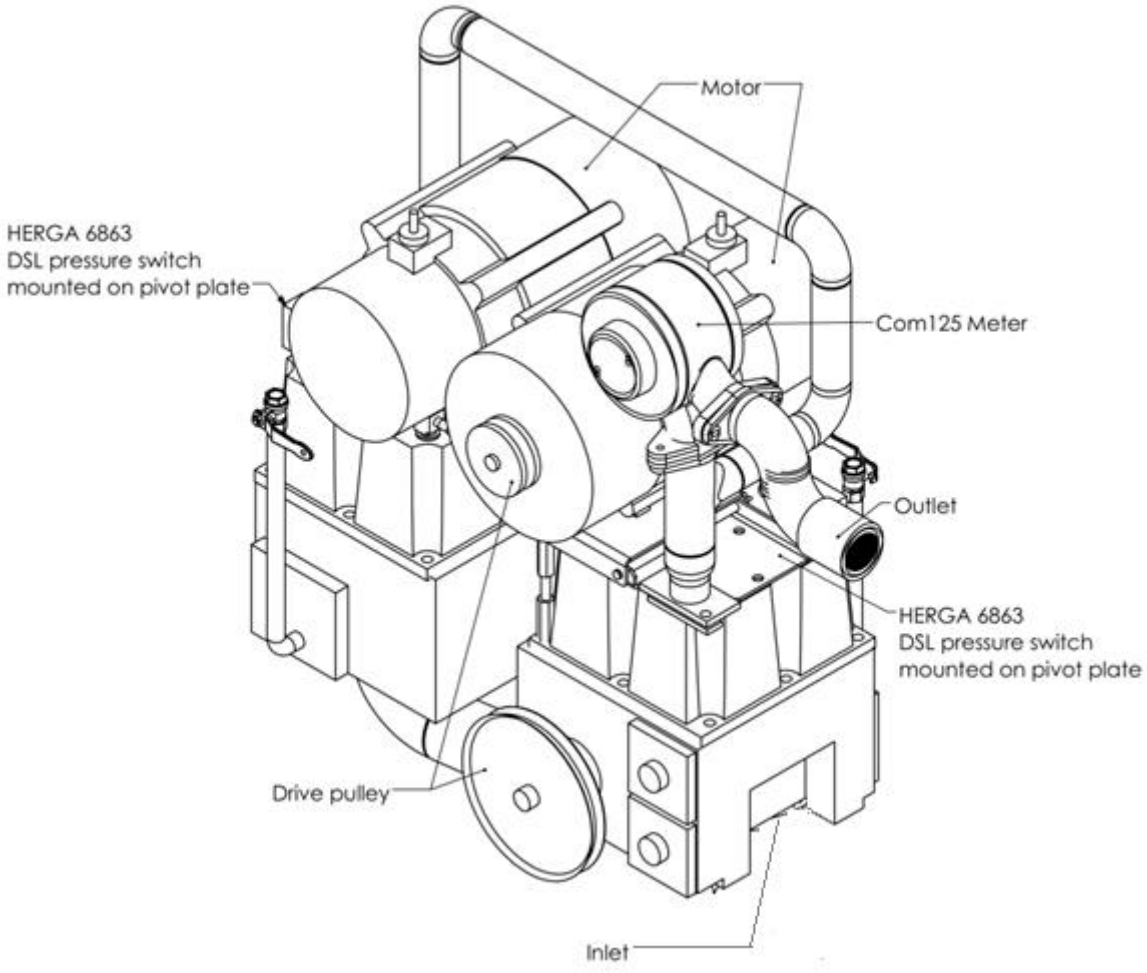


Single Aviation Dispenser

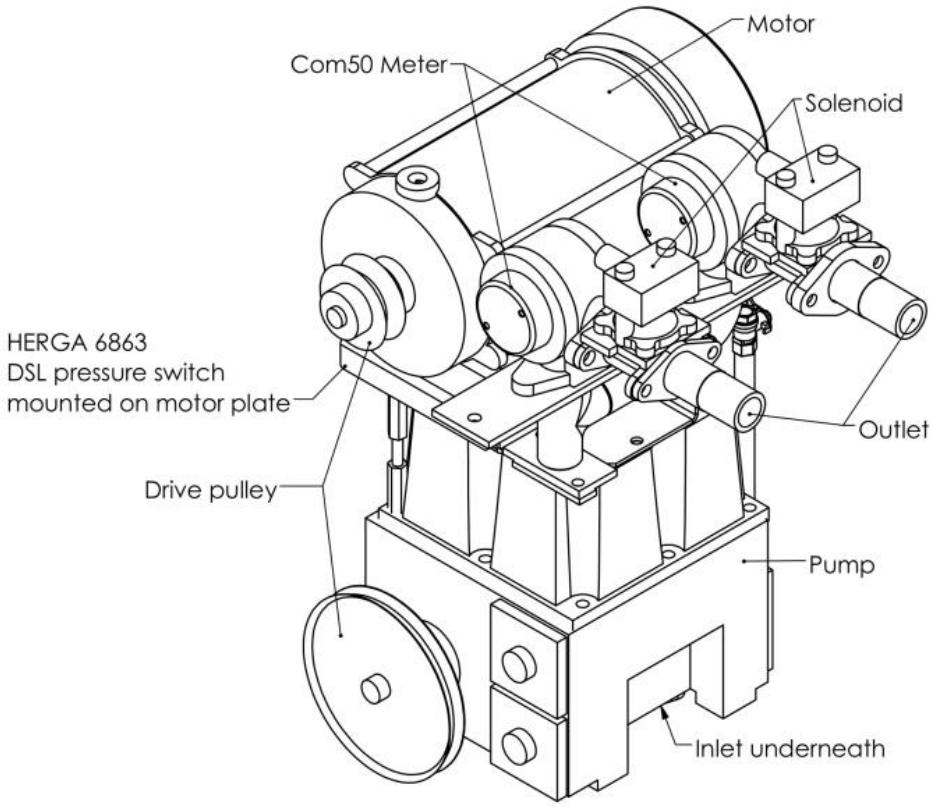


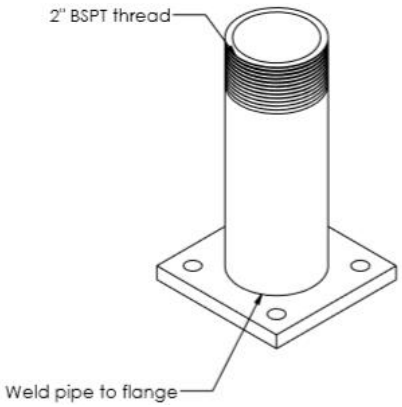
Single Pump


Motor
Com50 Meter
Solenoid
HERGA 6863
DSL pressure switch
mounted on pivot plate
Drive pulley
Outlet
Pump
Inlet underneath


Motor
HERGA 6863
DSL pressure switch
mounted on pivot plate
Com125 Meter
Outlet
HERGA 6863
DSL pressure switch
mounted on pivot plate
Drive pulley
Inlet

Dual Pump





NOTE: *The optional temperature probe is for the temperature compensation configuration.*

NOTE: *An inlet flange (shown below) can be screwed onto the Single High Flowrate Dispenser and the Single Aviation Dispenser, beneath the inlet pipework. The base of the inlet flange can be square (like in the diagram below) or circular, depending on the model.*

Electrical System

Generator Power

The power output from onsite generators can cause power spikes that may damage electrical components within the cabinet. When connecting to sites powered by generators, please take the following precautions:

Install power conditioner

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.

Shut down

Isolate the unit before shutting down the generator.

Triacs

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

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

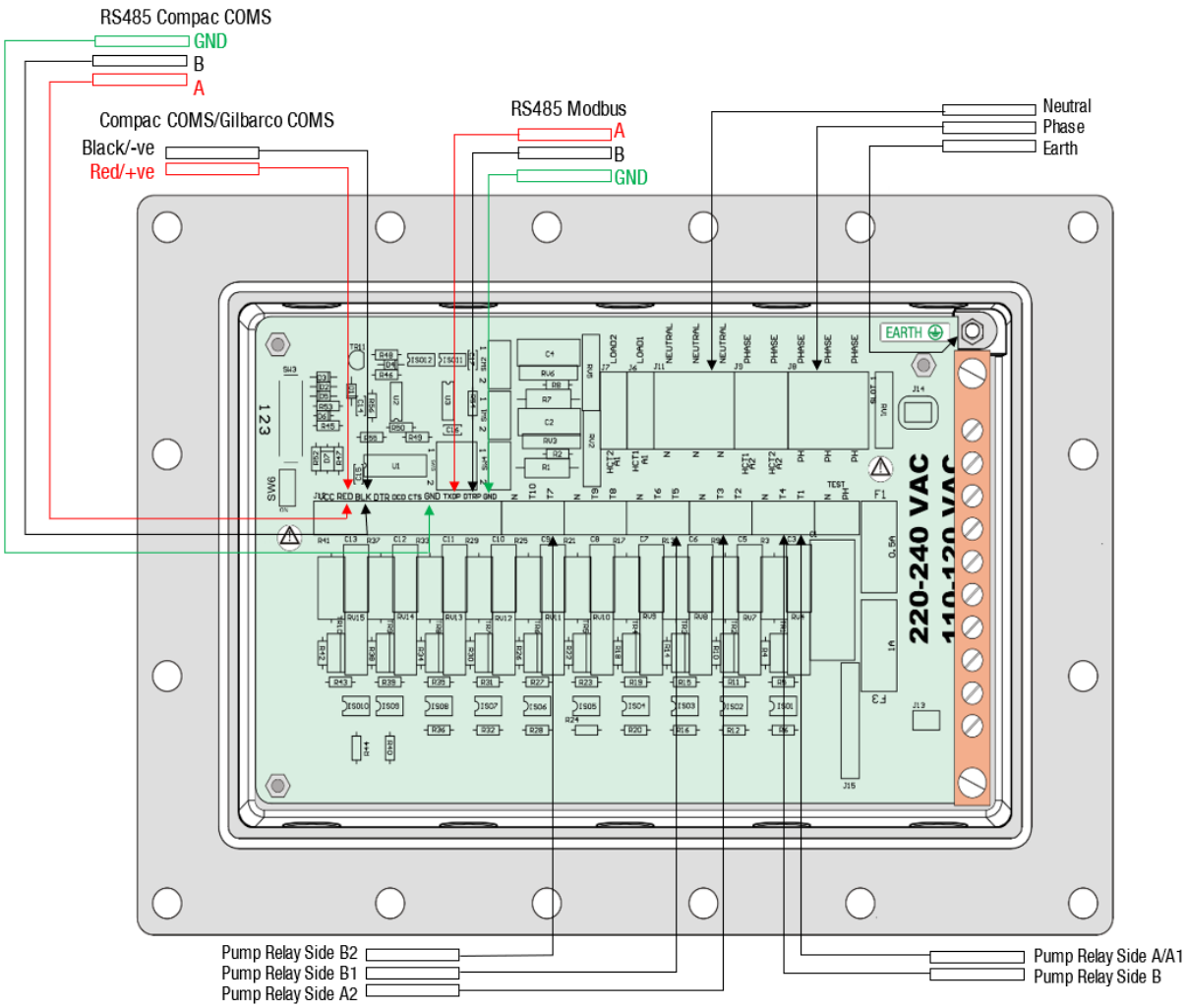
Communications Protocol

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

Position 1 = Compac COMMS Protocol

Position 2 = Gilbarco COMMS Protocol

Position 3 = RS-485 Protocol



NOTE: *Different software is required for each protocol*

Single/Dual

Power Terminal	Symbol	Function	High / Low Current Option
T1 or LOAD1	**MTR1**	Motor relay control (SW1 = 2) or Internal pump motor (SW1 = 1)	Low 300mA max or High (40 A max)
T2	**SFS1**	Low Flow Coil Solenoid 1 (Black)	Low (300 mA max)
T3	**PFS1**	High Flow Coil Solenoid 1 (White)	Low (300 mA max)
T4 or LOAD2	**MTR2**	Motor relay control (SW2 = 2) or Internal pump motor (SW2 = 1)	Low 300mA max or High (40 A max)
T5	**SFS2**	Low Flow Coil Solenoid 2 (Black)	Low (300 mA max)
T6	**PFS2**	High Flow Coil Solenoid 2 (White)	Low (300 mA max)
T7	**SFS4**	Ultra High Flow (Black and white joined)	Low (300 mA max)
T8	**SFS3**	Spare	Low (300 mA max)
T9	**PFS3**	Spare	Low (300 mA max)
T10	**PSF4**	Spare	Low (300 mA max)

Quad

Power Terminal	Symbol	Function	High / Low Current Option
T1 or LOAD1	**MTR1**	Motor relay control (SW1 = 2) or Internal pump motor (SW1 = 1)	Low 300mA max or High (40 A max)
T2	**SFS1**	Low Flow Coil Solenoid 1 (Black)	Low (300 mA max)
T3	**PFS1**	High Flow Coil Solenoid 1 (White)	Low (300 mA max)
T4 or LOAD2	**MTR2**	Motor relay control (SW2 = 2) or Internal pump motor (SW2 = 1)	Low 300mA max or High (40 A max)
T5	**SFS2**	Low Flow Coil Solenoid 2 (Black)	Low (300 mA max)
T6	**PFS2**	High Flow Coil Solenoid 2 (White)	Low (300 mA max)
T7	**SFS4**	Low Flow Coil Solenoid 4 (SW4 = 2) (Black)	Low (300 mA max)
T8	**SFS3**	Low Flow Coil Solenoid 3 (Black)	Low (300 mA max)
T9	**PFS3**	High Flow Coil Solenoid 3 (White)	Low (300 mA max)
T10	**PSF4**	High Flow Coil Solenoid 4 (White)	Low (300 mA max)

Intrinsically Safe Wiring

Nozzle Switches

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

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

Air Detector Switch

The Air detector cut-out switch is required on any Bennett pump pumping diesel or any Bennett pump pumping any product at more than 55 litres per minute. This switch is a 'normally open' pressure-activated switch, which closes when the pressure of the air venting from the pumping unit exceeds a preset level. The closing of this switch disables the C4000's outputs, ending the transaction in progress. The pump can be re-authorised and another transaction can take place immediately after the pump stops, without the need to de-power and re-power the electronics.

Sump Switch

The Sump Switch is a float switch located in a sump at the bottom of the dispenser. If the dispenser pipework leaks, then the tray fills with product, thereby activating the switch.

If the switch closes, then the dispenser stops and the litres display reads "SunP".

The Sump Switch is wired into the SUMP and GNS terminals on the J12 connector. If there is more than one head in the dispenser (e.g. MHD6), then the sump switch is to be connected to both heads. Ensure that the SUMP terminals are joined and the GNS terminals are joined.

CAUTION: Do not connect the GNS terminal on one head to the SUMP terminal on the other.

Card Readers

The C4000 can drive two Card readers. They plug into the C4000 Microprocessor PCB (Connectors J15 & J16). The Card readers can be a 'Track 1' or 'Track 2' type card-reader. The 'track' number indicates the track on the magnetic strip of the card which will be read.

Compac Systems will be either a TK1 or a TK2 type, and will never be used both together. This is because information is coded, and therefore gathered, from either the first track or the second track of the coded magnetic strip.

Display Backlighting

The backlighting units for the display PCB's are mounted behind the LCDs and should not be removed. The backlighting is supplied from the C4000 *'Backlight'* plug (J17). This is an intrinsically safe supply.

High/Low Flow Switches

A High Flow/Low Flow option is available on high flow dispensers/pumps. The two-position switch is located on the side of the dispenser/pump by the nozzle holster.

In the high flow position, the full flow rate of the pump/dispenser will be available at the nozzle. In the low flow position approximately 40 to 70 lpm will be available depending upon the application.

Type 1

When the pump is fitted with a hi-lo flow switch, it enables the user to be able to select two different flow rates.

When the hi-low switch is used in the "HI" position, it energises outputs on the C4000 to operate motors #1 and #2 (with a one-second interval before motor #2 starts), which in turn operates their associated pump.

When the hi-lo switch is in the "LOW" position, only motor #1, and its associated pump operates.

NOTE: *The changing of the Flow Selector switch position during a transaction has an immediate effect on 'Pump 2's' operation. I.e. The motor for 'Pump 2' can be turned off and on during a transaction.*

Type 2

This is used in dispensers supplied by submersible pumps and in pumping units with a preset operation.

Two solenoids are installed in parallel after the meter. For high flow, both solenoids valves are open. For low flow, only one solenoid valve is open.

Servicing

Maintenance Schedule

Maintenance operation	Weekly	Monthly	6 Months	12 Months
Check the pump/dispenser panels and fascia for any sign of physical damage or missing parts, screws etc. Arrange a service agent to fit replacement parts where required	x	x	x	x
Record the electromechanical and electronic tote	x	x	x	x
Run a cleaning card with cleaning fluid on it through the card reader (If fitted). This may need to be carried out daily on high-use sites or sites in areas with a lot of dust present.		x	x	x
Check the operation of the card reader with a test card		x	x	x
Clean the display fascia		x	x	x
Clean the pump/dispenser panels		x	x	x
Inspect the refuelling hose, breakaway and nozzle for damage. Replace if required		x	x	x
Check the operation of the nozzle switch		x	x	x
Perform a test transaction and check the printed receipt is legible. Check the printer paper roll and replace if it has less than 10mm of paper remaining on the reel measured from the side of the roll.		x	x	x
Check all the wiring terminations are tight, the K factor seal is in place			x	x
Conduct a segment test using the parameter button and check display for shorts / corrosion etc.			x	x
Check there is no moisture or water inside the cabinet, also check the sump for water and pump out if necessary.			x	x

Maintenance operation	Weekly	Monthly	6 Months	12 Months
Run a test fill and check the calibration and flow rate. If the flow rate is low, investigate and change the filter if required.			x	x
Inspect the pump / dispenser for fuel leaks			x	x
Check that the motor belt is correctly tensioned, and it is not worn or frayed			x	x
Check the mains and non-intrinsically safe cables for damage or bare wires and that explosion-proof glands are in place where required				x
Visually check that no non-standard modifications have been made to the wiring within the dispenser				x
Change or clean the filter (If fitted)				x
Check that the lids are fitted to explosion proof and vapour proof enclosures and that all lid fixing screws, bolts and seals are in place.				x

Dispenser/Pump Calibration (K-Factor)

The 'K' Factor is a ratio of litres dispensed per revolution of the meter.

To calibrate the dispenser/pump use the following formula:

$$\frac{Dispensed\ Volume}{Displayed\ Volume} \times Existing\ K\ Factor = New\ K\ Factor$$

Dispense fuel into a certified measuring container and compare the display value with the amount dispensed. Once you have found the New K Factor, enter it using the K-Factor switch.

Software Upgrade Procedure

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

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

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

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

CAUTION

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

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

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

Adjusting Drive Belt Tension

Fuel dispensers fitted with internal pumps use a drive belt to transmit power from the electric motor to the pump. The belt is relatively maintenance free but may require adjustment if it is slipping or has been replaced.

If the belt is slipping, it will squeal when under load. Before adjusting, check the following:

- Is the belt cracked or fraying?
- Is the belt worn?
- Are the sides or bottom of the belt glazed?
- Are the pulleys damaged or worn?

If the belt shows any of the above signs it should be replaced and tensioned.

Use the following procedure to adjust the belt tension:

- Loosen off the drive belt adjusting bolt until the belt is slack.
- Tighten the belt just enough to stop slipping and the belt deflects approximately 10 mm to 12 mm when lightly pushed. It is better to have the belt too loose rather than too tight.
- Tighten the locking nut.
- Run the pump under load and check for slippage.
- For new belts, run the belt in for 10 minutes or so and recheck the tension.

You can check the current draw of the motor; it should be 5 amps or less when under load.

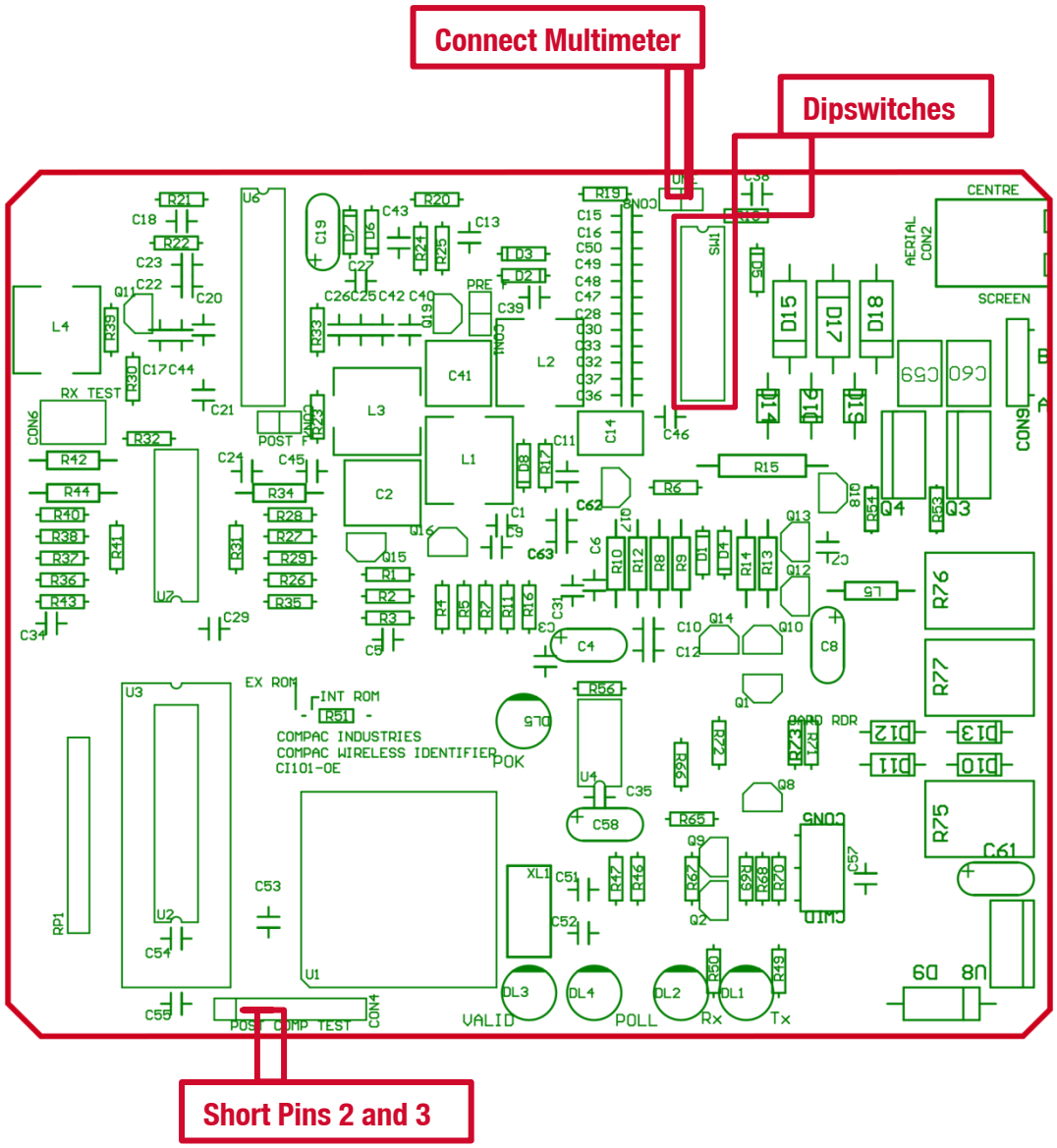
CAUTION

Over tensioning the drive belt may cause the following:

- Motor overheating
- Motor and pump bearing wear
- Excess belt wear

CWID Servicing

Whenever the CWID board or aerial is replaced, or comissioned, the CWID board must be tuned. Tuning should always be done with the CWID aerial attatchd to the nozzle. Ensuring that the CWID aerial is tuned properly is vital to the performance and reliability of the system.

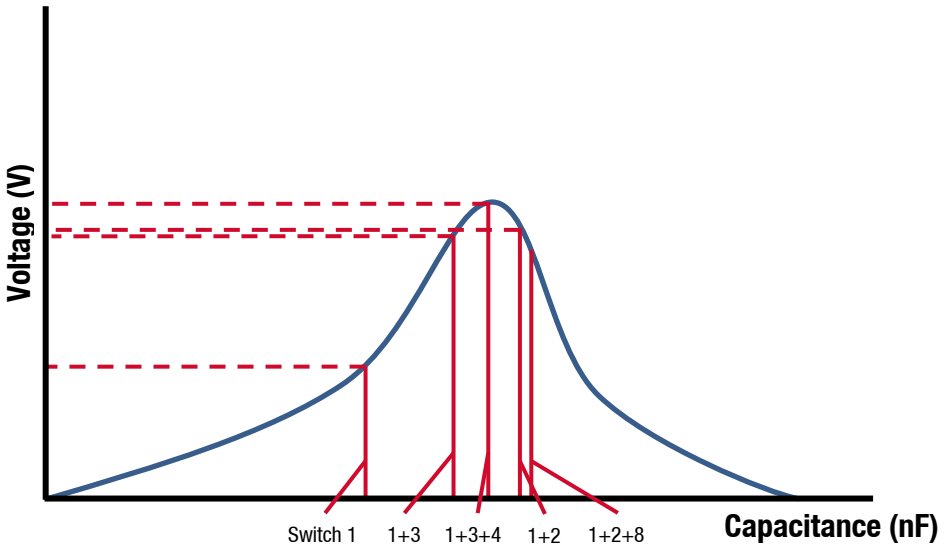


Tuning

The Dipswitches add capacitance to an LC circuit. The aim is to tune the capacitance to achieve the resonance frequency of the circuit, producing the maximum voltage. Based on the inductance of the circuit, resonance will be achieved at a unique capacitance, which we are trying to find using the tuning procedure below. This will result in the greatest possible range and reliability of the aerial.

Although unnecessary for the tuning procedure, the diagrams give information on how the dipswitches can be used to get as close as possible to the unique capacitance which induces peak voltage. In the scenario shown in the diagram, turning on switch 2 after switch 1 will increase the voltage output, but will overshoot the maximum voltage (this will be shown by a voltage decrease when turning on switch 8). Turning off switch 2 and turning on switch 3 and then 4 will result in a higher voltage.

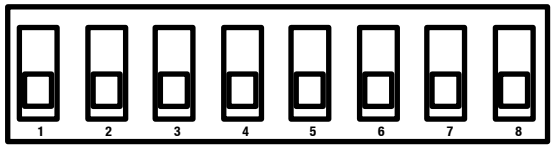
Dipswitch (SW1)	Capacitance (nF)
1	4.7
2	2.3
3	1.33
4	0.66
5	0.33
6	0.1
7	0.1
8	0.1



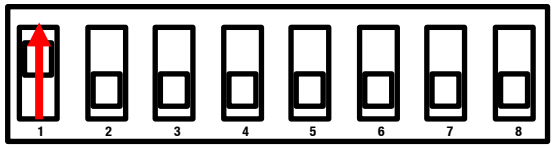
Tuning Procedure

In order to get as close to the peak voltage as possible, follow this tuning procedure:

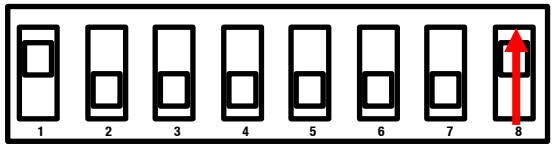
- Short pins 2 and 3 of CON4 on the CWID PCB and connect a multimeter to CON8.
- Starting with switch 1, turn on a switch. If the voltage increases, turn on switch 8. If the voltage increases again, turn off switch 8 and move on to the next switch to the right. If turning on a switch decreases the voltage, turn off the switch and move on to the next switch to the right. If turning on switch 8 decreases the voltage, turn off switch 8 and the switch, and move on to the next switch to the right. Repeat this process for all of the switches.



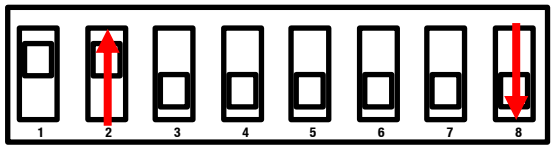
Turn on switch 1

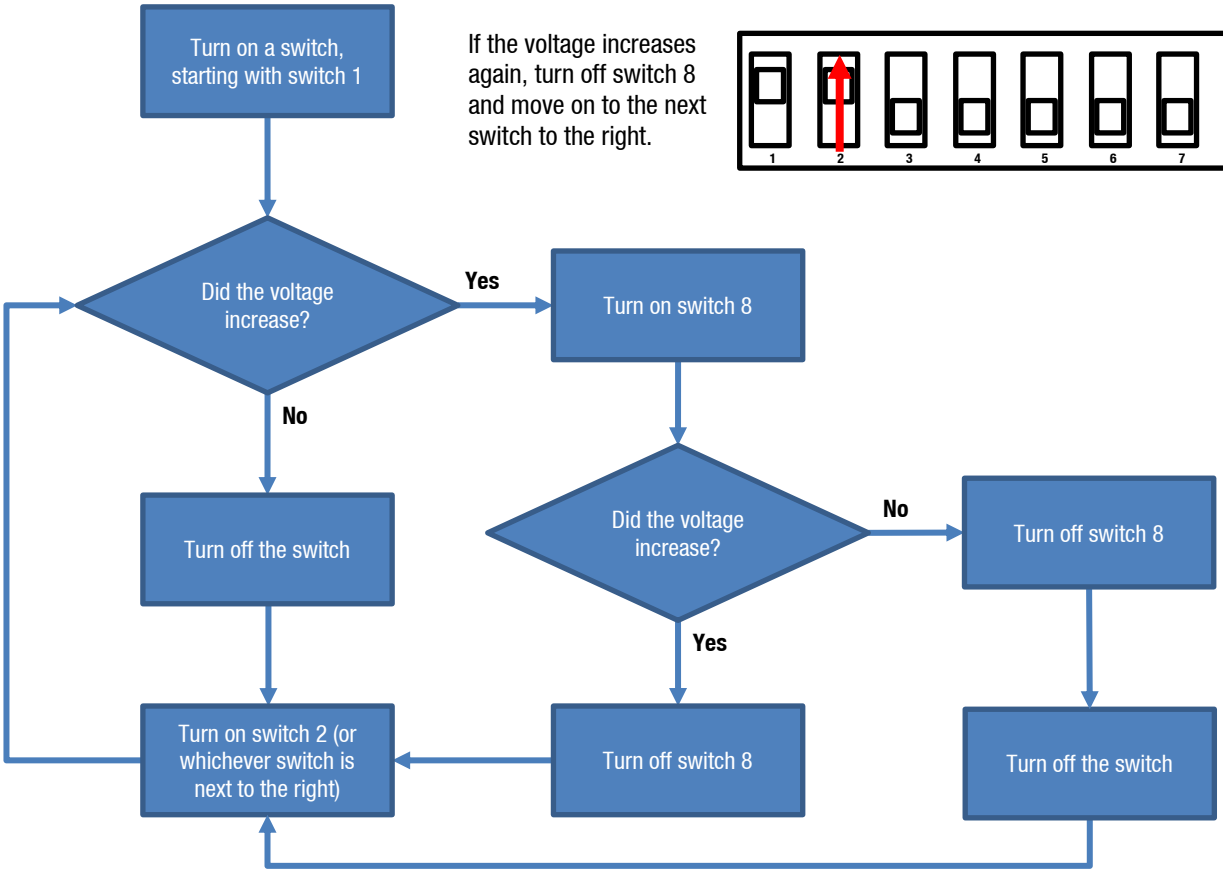


If the voltage increases, turn on switch 8.



If the voltage increases again, turn off switch 8 and move on to the next switch to the right.





Trouble Shooting

Electrical

No Power

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

Pump Cuts Out

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

Pump Not Starting

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

Pump Not Stopping

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

Solenoid Not Energising

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

Solenoid Not De-energising

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

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

Error Messages

Error Code	Fault	Solution
Err 3	No price set.	Set a price at the pump or at the controller.
Err 7	Excess flow.	Excess flowrate detected, check for leaks and check K-Factor
Err 8	Reverse flow.	Check product is not flowing back into the tank once the delivery has finished. This only occurs if the non-return valves installed on site are faulty.
Err 9	Faulty or disconnected meter encoder.	Check meter wiring. Replace meter.
Err 10	Configuration lost.	Reconfigure C4000. Note: If this fault re-occurs the Memory IC should be replaced.
Err 12	C4000 memory failure.	Change memory IC.
Err 13	Disconnected/Faulty Temperature Board or Temperature Probe	Check that both the temperature probe and board are connected. Replace them if faulty.
0:00	The processor supply has been OFF and back ON since the last transaction.	Check mains supply to dispenser. If there is not a supply problem check and replace C4000 Power supply and/or Processor board.
cAL ib	Calibration required.	Check meter K-Factor. The C4000 will recognise that the K-Factor has been viewed and will use the existing K-Factor. If necessary, recalibrate the meter.
Abd PEd PEP PSd PSP	The display has an error	Check for moisture or humid environment, Contact your service agent.

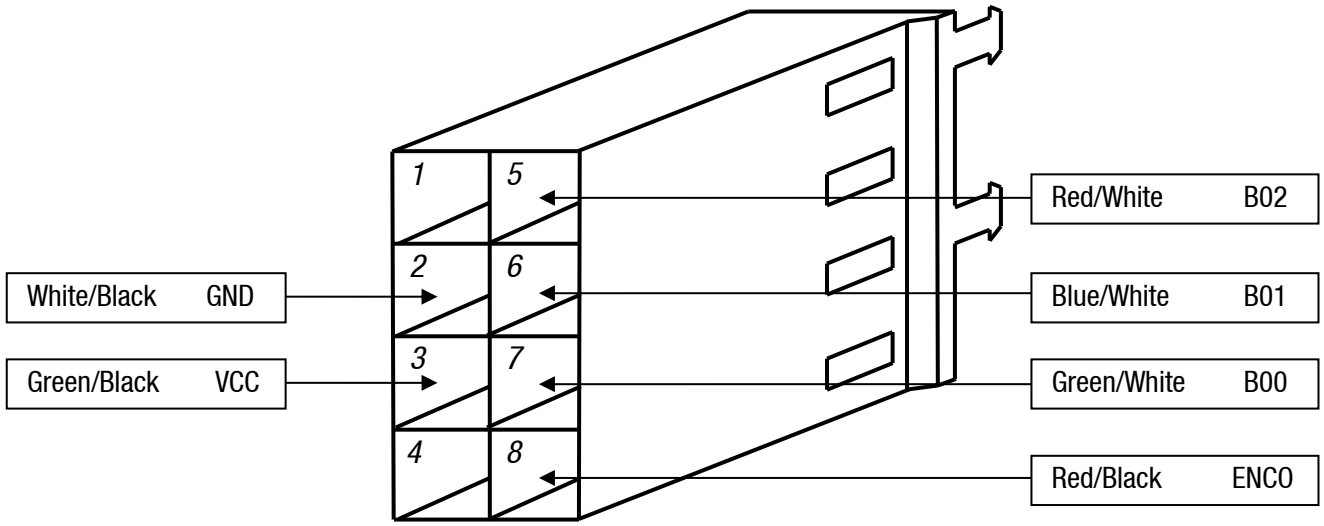
End of Sale Indications

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

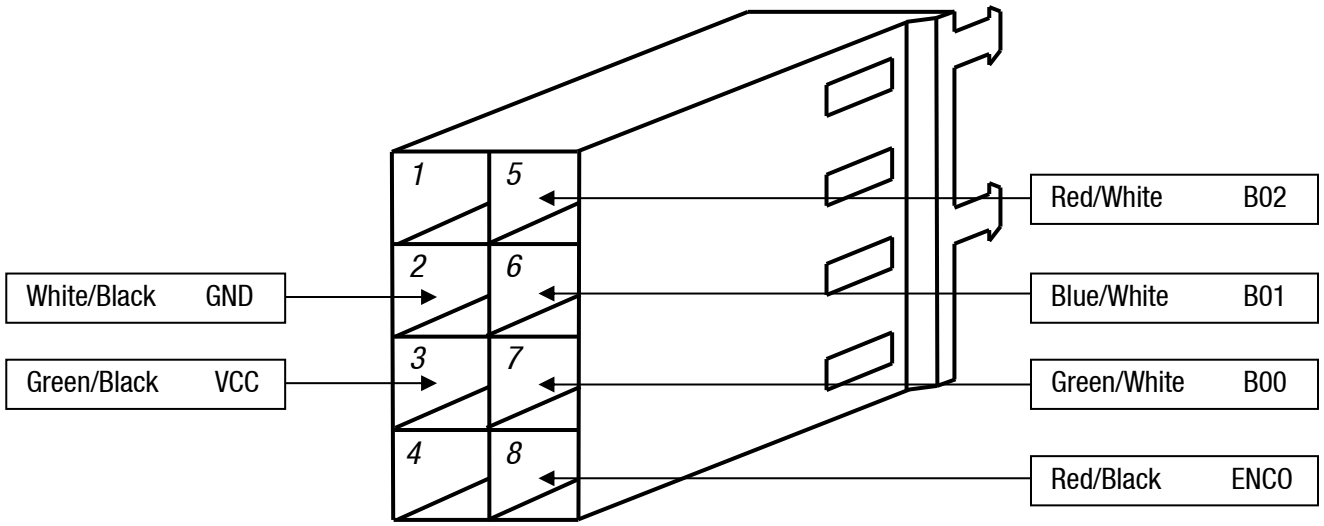
Numerical Indicator	Readout	Explanation
1	"NOZ"	Nozzle hung up.
2	"PRESET"	Stopped at the preset. For CNG dispensers - completed a temperature compensated fill
3	"TIMEOUT"	No flow.
4	"REMSTOP"	Pump controller initiated stop.
5	"MAX"	Maximum litres and/or dollars reached.
6	"AIR"	Air cut-out (Diesel air cut-out switch).
	"GAS"	Creepage due to vapour (LPG Dispenser).
7	"ERROR"	Encoder error, excess flow, etc.
9	"SUMP"	Switch activated by leaking product.
12	“DPE MAIN”	Parity error on main display
13	“DPE MP”	Parity error on multi price display
14	“DA MAIN”	Parity error on main display
15	“DA MP1”	Parity error on multi price display 1
16	“DA MP2”	Parity error on multi price display 2
17	“DA MP3”	Parity error on multi price display 3
18	“DA MP4”	Parity error on multi price display 4

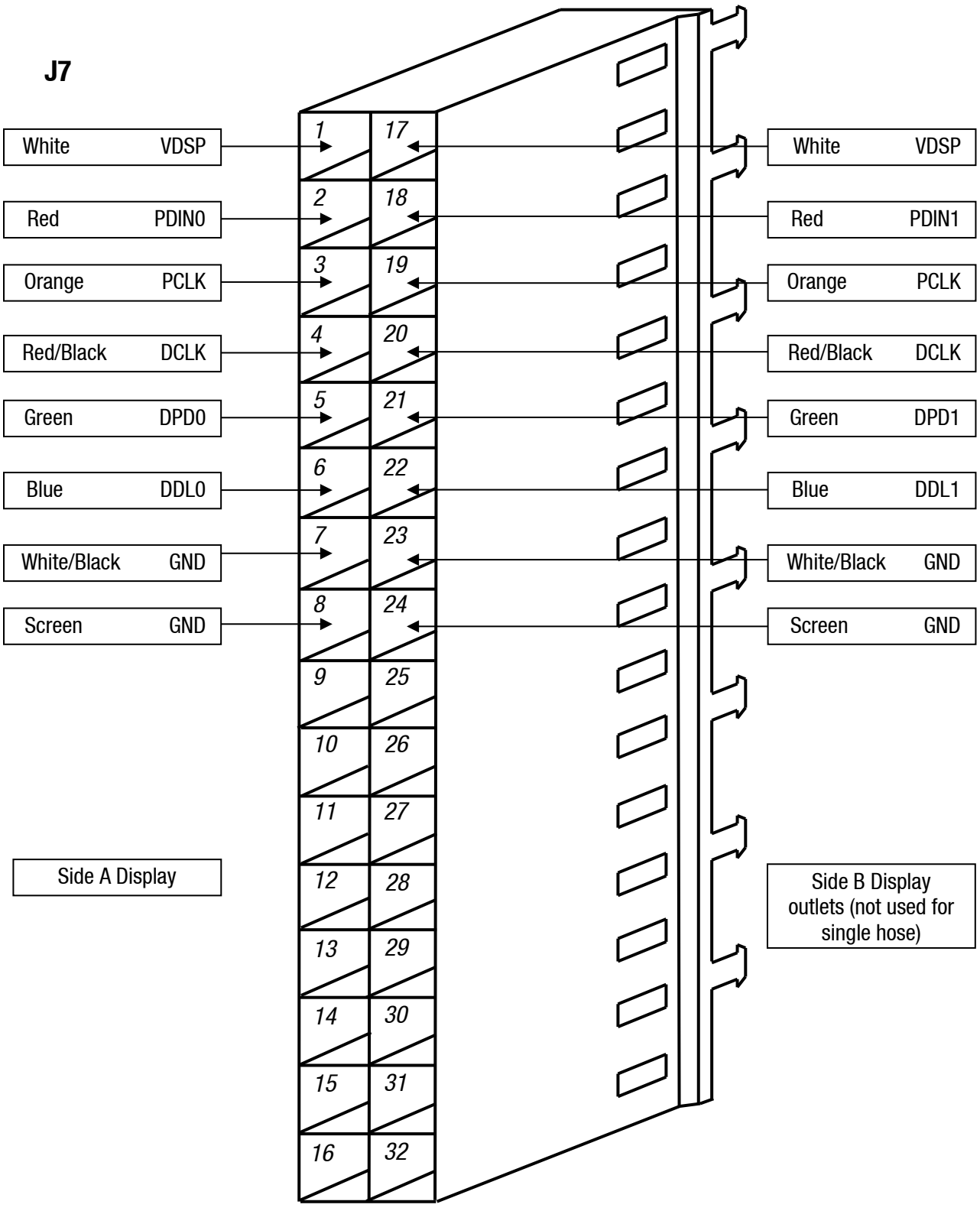
J Cable Connections

J3

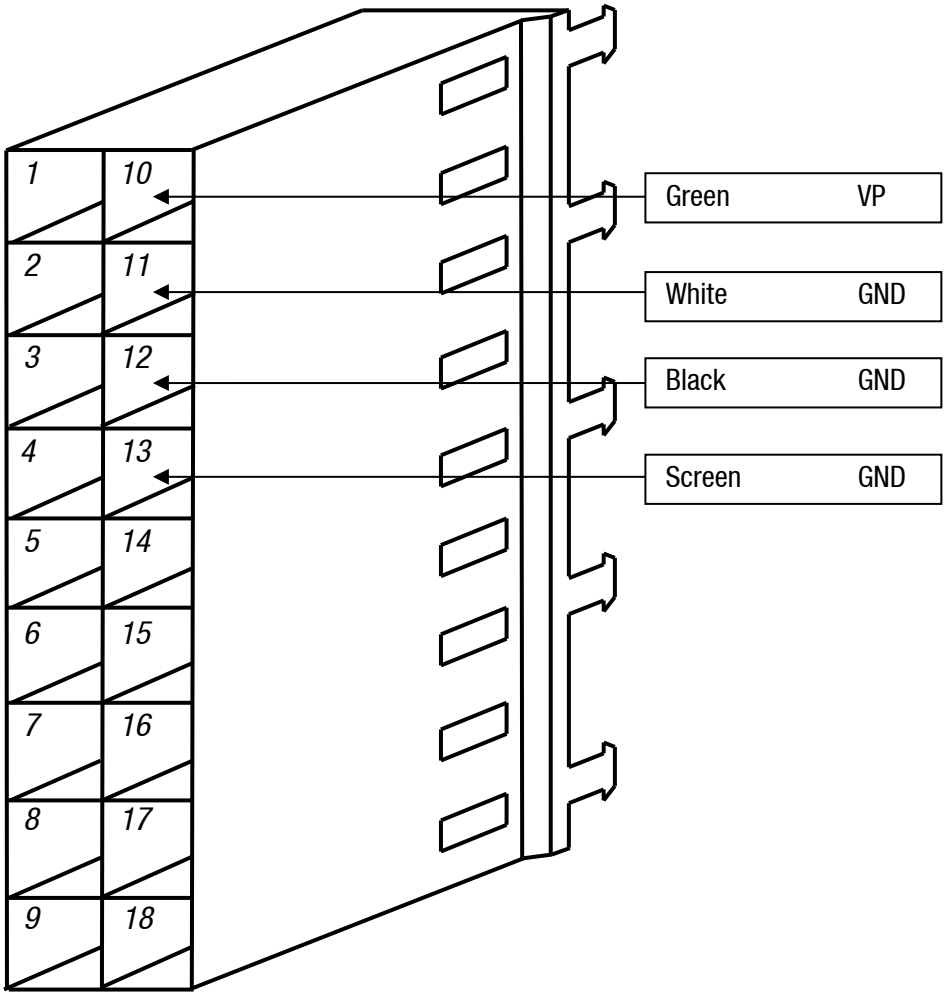


J4

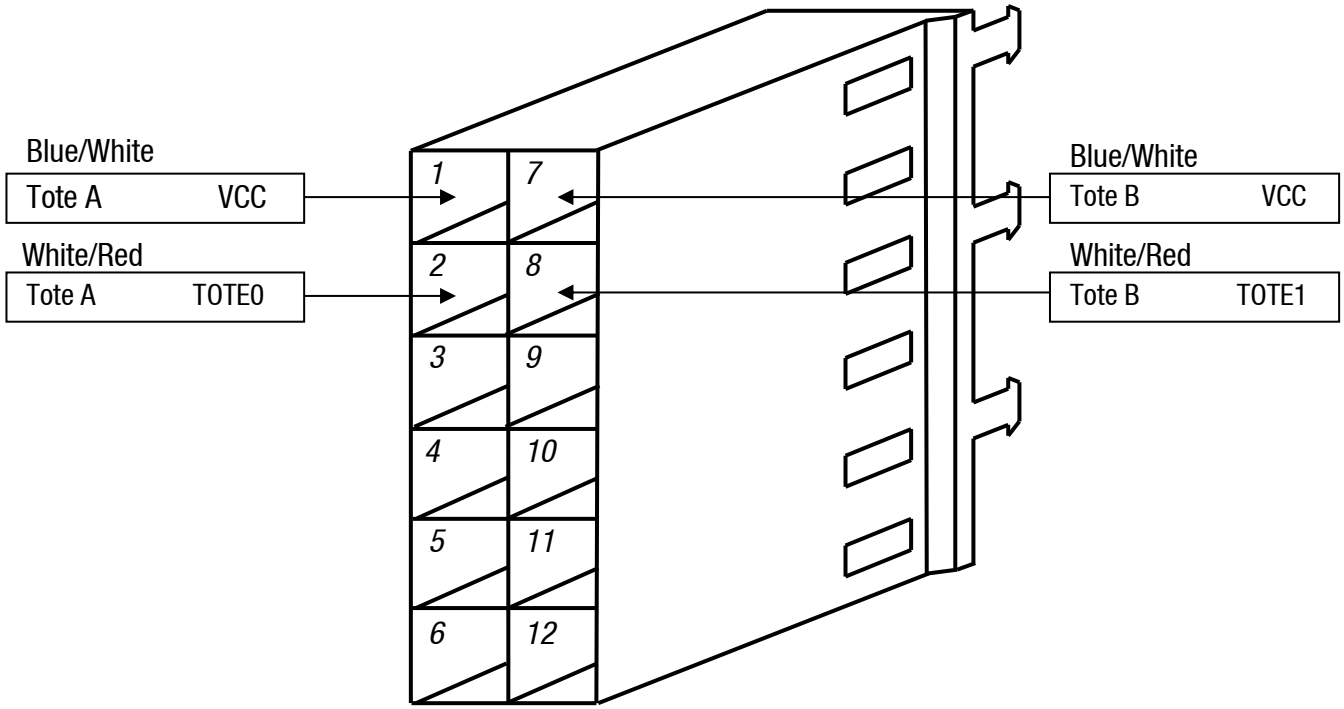



J7
White VDSP
Red PDIN0
Orange PCLK
Red/Black DCLK
Green DPD0
Blue DDL0
White/Black GND
Screen GND
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
White VDSP
Red PDIN1
Orange PCLK
Red/Black DCLK
Green DPD1
Blue DDL1
White/Black GND
Screen GND
Side A Display
Side B Display outlets (not used for single hose)

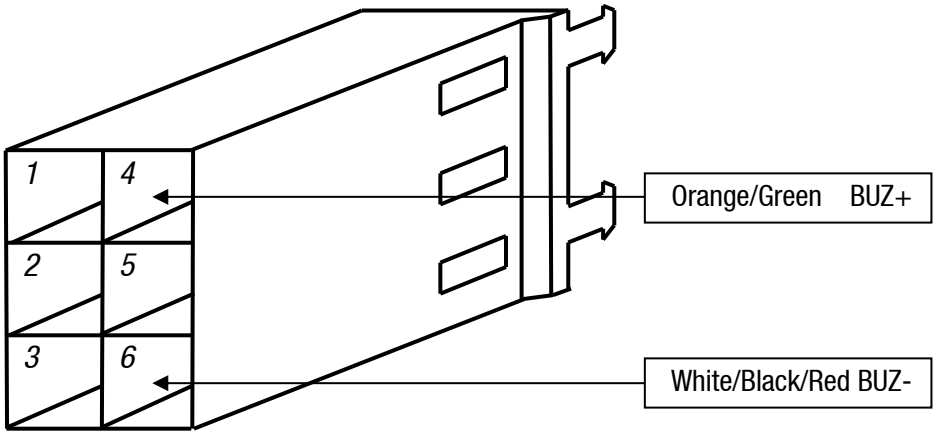
J9


1
10
2
11
3
12
4
13
5
14
6
15
7
16
8
17
9
18
Green VP
White GND
Black GND
Screen GND

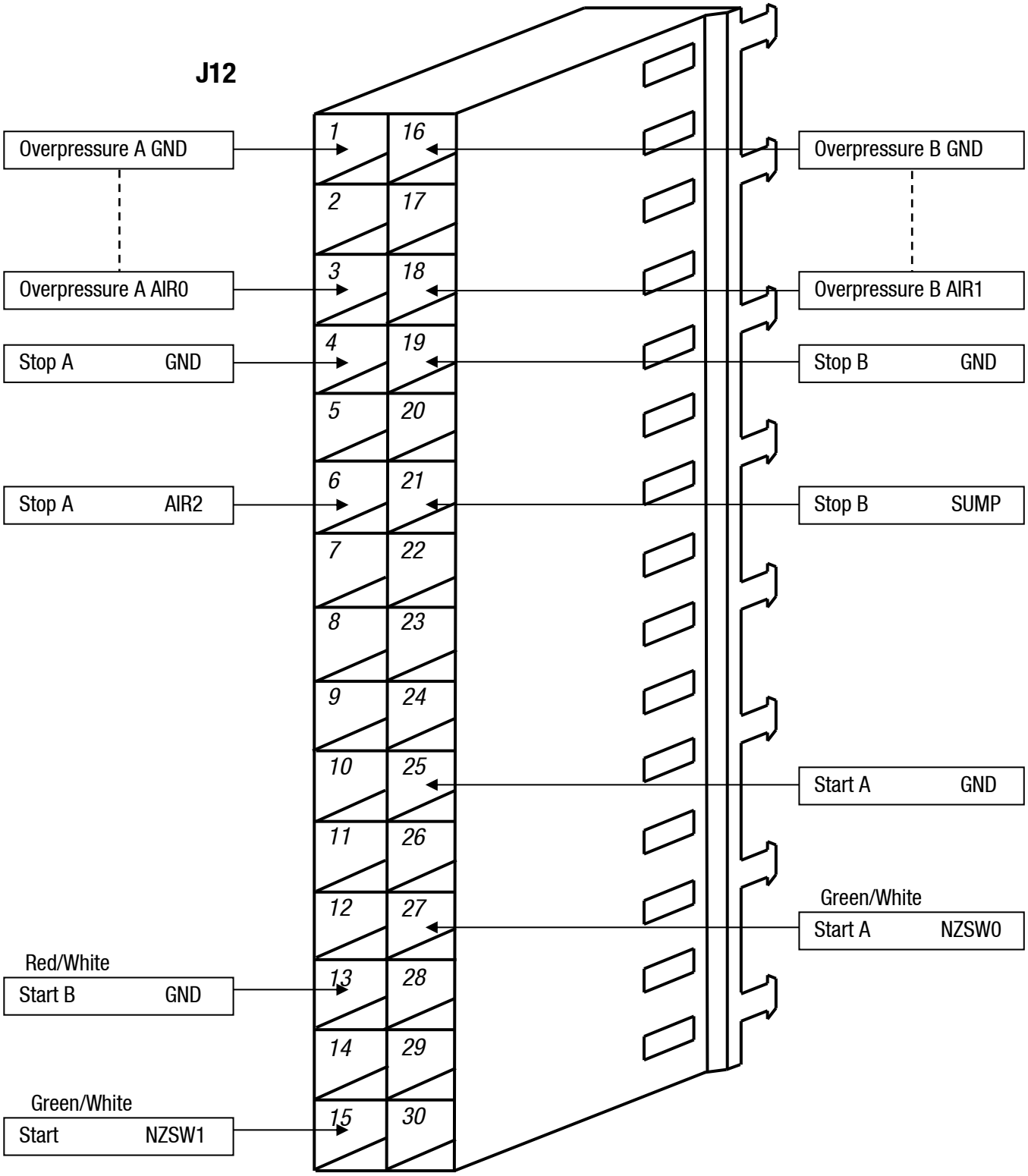
J10


Blue/White
Tote A VCC
White/Red
Tote A TOTE0
1
2
3
4
5
6
7
8
9
10
11
12
Blue/White
Tote B VCC
White/Red
Tote B TOTE1

J11


1
2
3
4
5
6
Orange/Green BUZ+
White/Black/Red BUZ-

J12


Overpressure A GND
Overpressure A AIR0
Stop A GND
Stop A AIR2
Red/White
Start B GND
Green/White
Start NZSW1
1
2
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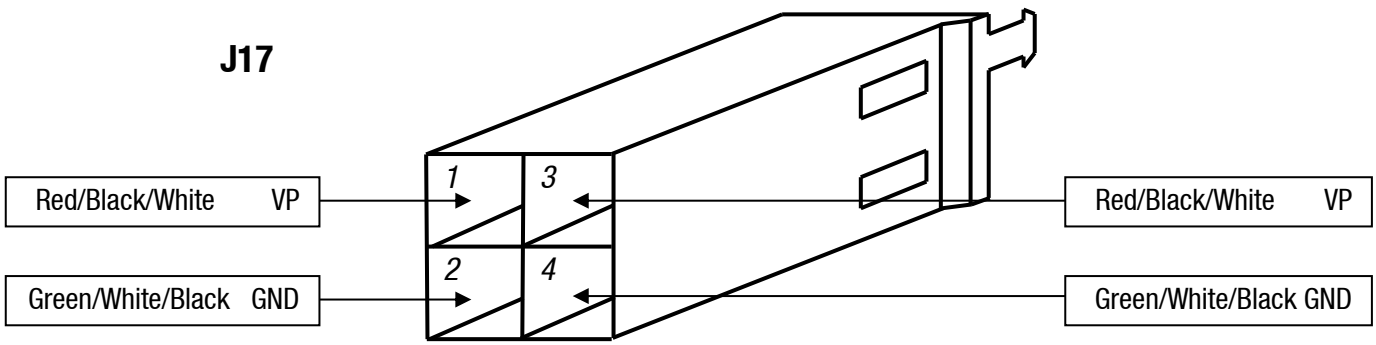
Overpressure B GND
Overpressure B AIR1
Stop B GND
Stop B SUMP
Start A GND
Green/White
Start A NZSW0

J17


Red/Black/White VP
Green/White/Black GND
1
2
3
4
Red/Black/White VP
Green/White/Black GND