C4000 Master Manual

Version 1.0.2a

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 this unit 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 installing and operating the unit 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 unit or damages resulting from the inability to use the unit including loss of profits, loss of products, loss of power supply, the cost of arranging an alternative power supply, and loss of time, whether incurred by the user or their employees, the installer, the commissioner, a service technician, or any third party.

- Compac Industries Limited reserves the right to change the specifications of its products or the information in this manual without necessarily notifying its users.

- Variations in installation and operating conditions may affect the unit's performance. Compac Industries Limited has no control over each installation's unique operating environment. Hence, Compac Industries Limited makes no representations or warranties concerning the performance of the unit under the actual operating conditions prevailing at the installation. A technical expert of your choosing should validate all operating parameters for each application.

- Compac Industries Limited has made every effort to explain all servicing procedures, warnings, and safety precautions as clearly and completely as possible. However, due to the range of operating environments, it is not possible to anticipate every issue that may arise. This manual is intended to provide general guidance. For specific guidance and technical support, contact your authorised Compac supplier, using the contact details in the Product Identification section

- Information in this manual shall not be deemed a warranty, representation, or guarantee. For warranty provisions applicable to this unit, please refer to the warranty provided by the supplier.

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Contents

Product Identification C4000 Processor

Manual Title	C4000 Processor Master Manual

Models Covered	All C4000 Series

Application	Power Supply	220 - 240 VAC; 50 Hz; 2 Amp +/- 10%

Related Manuals	Title	Publication Date
	C4000 Futra Manual	February 2009
	ComFutra Installation & Service Manual	September 2010
	CNG Dispenser Service Manual	February 2011
	C4000 LPG Manual	February 2009

Validity	Compac Industries Limited reserves the right to revise or change product specifications at any time. This publication describes the state of the C4000 processor at the time of publication and may not reflect the product at all times in the past or in the future.

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1.0.0	06/09/2010	R Lacey	Added RS485 and RS232 wiring info
1.0.1	13/01/2011	R Lacey	Amended RS485 wiring
1.0.2	10/02/2011	R Lacey	Added RS485 forecourt wiring

Distribution

Name	Indicator	Location

Symbols and Units of Measure

Symbols

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

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

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

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

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

Units of Measure

The following units of measure are used in this manual:

Unit	Measure
Pressure	Bar (bar)
Temperature	Degrees Celsius (°C)
Volume	Litres (L)
	Cubic Metres (m³)
Mass	Kilograms (kg)
Length	Metres (m)
	Millimetres (mm)
	Microns, Micrometres (μm)
	Inches (")
Torque	Newton Metres (Nm)
Voltage	Volts (V)
Current	Amps (A)
Frequency	Frequency (Hz)

Safety - C4000 Controller

You must adhere to the following safety precautions at all times when working on the Compac C4000 processor. Failure to observe these safety precautions could result in damage to the Compac C4000 processor, injury, or death.

Make sure that you read and understand all safety precautions before operating the Compac Compac C4000 processor.

Mechanical Safety

Observe the following mechanical precautions:

⚠ CAUTION *Make sure that the service area is thoroughly clean when servicing. Dust and dirt entering the components reduce the life span of the components and can affect operation.*

Electrical Safety

Observe the following electrical precautions:

⚠ CAUTION *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.*

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

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

Safety Precautions

⚠ CAUTION *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.*

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.

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

Electrical Commissioning

Cable Requirements

Cable requirements are as follows:

Cable Type	Requirements
Power	3 Core Steel Wire Armour Cable 2.5mm^2,
	220 - 240 Volts. 50 Hz, +/-10%
	Core 1: 230 Volt Supply (Active).
	Core 2: Neutral.
	Core 3: Earth.
	Dispenser:
	25w Idle, 200W with all solenoids active.
	Pumps with one motor (40 and 80 lpm Single hose)
	Motor start current = 30 amps, run current = 6 amps
	Pumps with two motors -40 and 80 lpm Dual pumps and 160 lpm Single hose pumps
	Motor start current = 30 amps, run current = 6 amps
	(software prevents both motors starting simultaneously)
Comms	2 Core Steel Wire Armour Cable 1.5 mm^2. Maximum cable length 100 m. 12 V current loop.

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

Connecting Mains Power and Communication

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

To connect the dispenser:

1. Wire the power and comms to the C4000 Termination Board, as shown in the diagram below.

2. Connect the earth lead of the supply cable to the earth stud in the flameproof junction box.

⚠ NOTE *All cables must be terminated with approved flameproof glands. The thread is 20 mm.*
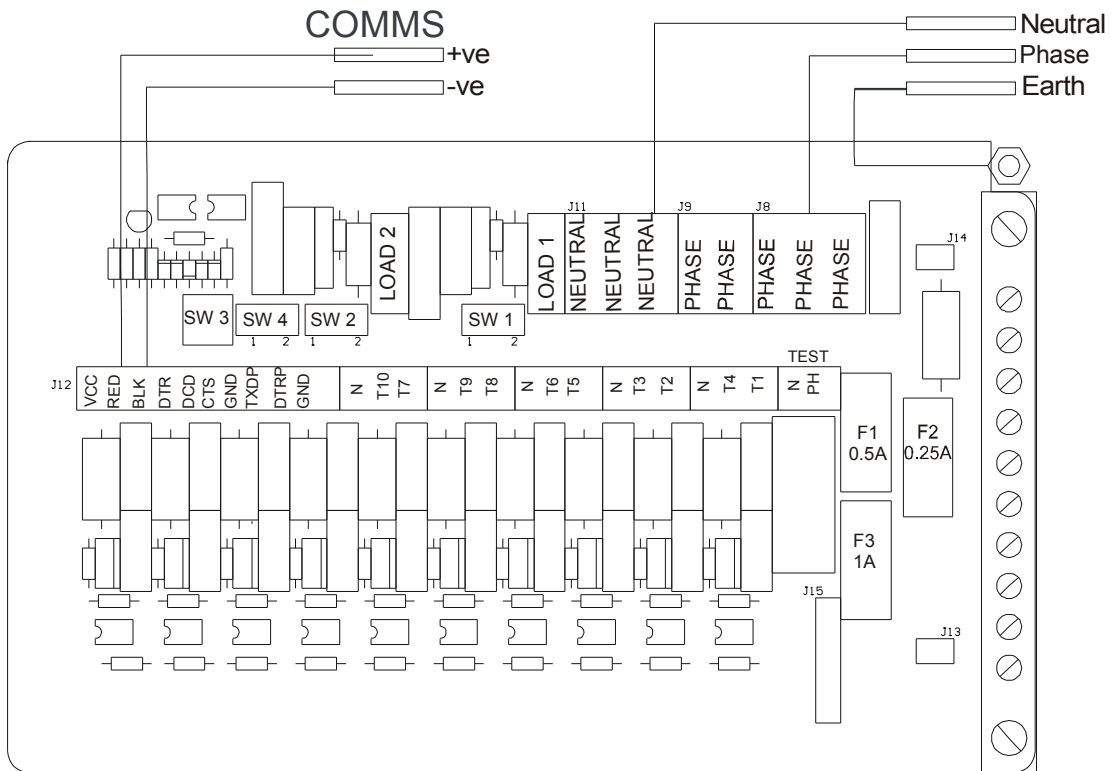
Refer Electrical Wiring C4000 (see page 45) for all other connections.

Electrical Commissioning C4000

This procedure outlines how to perform an electrical operational test before carrying out full mechanical commissioning and 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 but all K-factor and Parameter switch settings should be checked and confirmed before commissioning tests are carried out.*

Check that pump number is set. See Setting the Dispenser/Pump Number (see page 37)

Check the pump price is set. See Setting the Price per Litre (see page 34)

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.

3.   With the dispenser in a **ready state**, check that the C4000 Microprocessor Power LED (D1) is turned on

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

  ▪   Diagnostic LED (D18) slowly flashing. (If the dispenser is connected to an operational Controller, it flashes slowly but erratically. If the dispenser is not connected to a Controller, it flashes slowly and consistently.)

  ▪   Watchdog LED (D5) is turned off

4.   Lift the nozzle

The display will show 888888 and the solenoids energise, starting the pump motor. Check that Diodes D8, D10 and D11 turn on, indicating a signal is being sent to the triacs to open the solenoid valves.

The diagnostic LED (D18) flashes quickly when the start button is pushed or the nozzle removed from the holster to initiate a fill. When the button is released or nozzle returned to the holster it will return to the normal state and flash slowly.

5.   Verify solenoid operation by listening for a click, or by using a screwdriver tip or some other metallic tool to check for a magnetic field present on the solenoid coils.

The solenoids will switch off after four minutes. This is a default time-out setting in the software for situations when there is no fuel flow registered.

Main Features

The Compac C4000 is a microprocessor-based circuit board designed for use in liquid and gaseous fuel metering systems. It is suitable for commercial, retail, and bulk-metering applications and can be used for tank gauging, card reader access, and many other control functions.
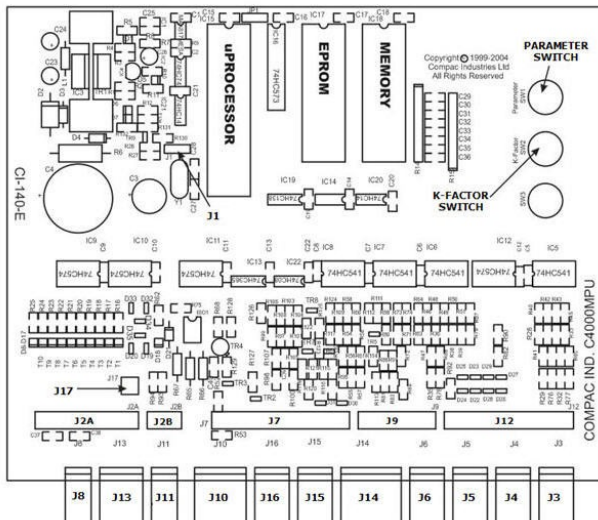
Connectors:

J1: Comms Test	**J7:** Displays	**J13:** CWIT/Secure
J2: To I.S. Power	**J8:** Temperature Comp.	PINPad
J3: Encoder 1	**J9:** PINPads	**J14:** Printers
J4: Encoder 2	**J10:** Totes	**J15:** Cardreader 1
J5: Encoder 3	**J11:** ParSw & Buzzer	**J16:** Cardreader 2
J6: Encoder 4	**J12:** Nozzle Switches	**J17:** Backlighting

Figure 1. Layout of C4000 Microprocessor Board

C4000 Components

The main components associated with the C4000 head are:

- Encoder
- Displays
- Litres
- Dollars, litres and price
- Litres, rate of flow and preset
- Preset
- Last Sale, kilograms, litres and price (CNG only)
- Temperature compensation
- Card-reader
- PIN/Odometer Pad
- Printer
- Modem
- Mechanical Totaliser (Tote)
- Nozzle Switch

Configurations

The C4000 'head' can be used with the equipment listed below in the following standard configurations:

Single Commercial Fuel Dispenser

Standard Options:

- Litres only display, two - one per side
- Motor circuit, one only
- One Encoder
- One Nozzle Switch
- C4000 Head
- Also see 'FUTRA' configuration.

Extras:

- Card-reader
- High/Low Flow Operation
- PIN-Pad

Single Suction Dual Commercial (Duo)

Standard Options:

- Litres only display, four - two per side
- Two motor circuit.
- Two Encoders
- Two Nozzle Switches
- C4000 Head

Extras:

- Preset

Dual Commercial (Dual or Double)

Standard Options:

- Litres only display, four - two per side
- Two Motor circuits
- Two Encoders
- Two Nozzle Switches
- C4000 Head

Extras:

- Preset

Single Retail

Standard Options:

- Dollars, litres and price display, two - one per side
- Presets, two - one per side
- One Encoder
- One Nozzle Switch
- One Motor Output
- C4000 Head

* Also see 'FUTRA' configuration

Extras:

- Card-reader
- PIN-Pad
- Receipt Printer

Single Suction Dual Retail (Duo)

Standard Options: **Extras:**

- Dollars, litres and price display, two - one per side
- Presets, two - one per side
- Two Encoders
- Two Nozzle Switches
- Two Motor Outputs
- C4000 Head

Dual Retail (Dual or Double)

Standard Options: **Extras:**

- Dollars, litres and price display, four - two per side
- Presets, four - two per side
- Two Encoders
- Two Nozzle Switches
- Two Motor Outputs
- C4000 Head

Multi Product (4 hose) Retail

Standard Options: **Extras:**

- Dollars, litres and price display, two - one per side
- Presets, two - one per side
- Four Encoders
- Four Nozzle Switches
- Two Motor Outputs
- One C4000 Head
- Multi-price Displays, four – one per product per side

- Card-reader
- PIN Pad
- Receipt Printer

Multi Product (4 hose) Retail, Type 'A'

Standard Options: **Extras:**

- Dollars, litres and price display, four - one per product per side
- Presets, four - one per product per side
- Four Encoders
- Four Nozzle Switches
- Two Motor Outputs
- One C4000 Head

Multi Product (6 hose) Retail

Standard Options:

- Dollars, litres and price display, two - one per side
- Presets, two - one per side
- Six Encoders
- Six Nozzle Switches
- Three Motor Outputs - shared by C4000 Heads
- Two C4000 Heads
- Multi-price Displays, six - one per product per side

Extras:

- Card-reader
- PIN Pad
- Receipt Printer

Multi Product (6 hose) Retail, Type 'A'

Standard Options:

- Dollars, litres and price display, six - three per side
- Presets, six - three per side
- Six Encoders
- Six Nozzle Switches
- Three Motor Outputs - shared by C4000 Heads
- Two C4000 Heads

Extras:

Futra (Uses 'Futra' Software)

(This type is a stand-alone system that cannot be set up to communicate to any type of controller.)

Standard Options:

- Litres Only Display
- Motor Circuit (One only)
- One Encoder
- One Nozzle Switch
- C4000 Head
- PIN-Pad

Extras:

- Card Reader
- Retail Displays
- Preset
- Modem
- High/Low Flow Operation
- Tank Gauging, for one tank only
- Receipt Printer

Set-up Modes

To enable the C4000 to operate as desired two things must be set:

1. Configuration (K Factor) Switch Settings

Refer **C4000 Set-Up K Factor Switch Settings** (see page 21)

This switch accesses different options that must be set appropriately for the particular type of dispenser.

2. Parameter Switch Settings

Refer **Parameter Switch** (see page 33)

This switch is used to conduct the Display Segment Test, set price (product density - if a bulkmeter or LPG), and set pump number. Also, when the C4000 is configured for 'Comcard', 'Compin', or 'CWIDKey' the parameter switch is used for card/pin/key validation and for setting the card/key system number

Configuration Code

The C4000 pump/dispenser software, the configuration code (used to set the pump/dispenser to single, dual or multi mode) has been extended to 5 digits. When configuring the pumps/dispensers, the litre display will display each digit.

⚠ NOTE   *For FUTRA software configuration options, see the FUTRA service supplement.*

⚠ NOTE   *Multi-hosed Pump/Dispenser with LPG*

An MPD with LPG is configured by setting digits 5=3 and 4=5.

With COM125 magnetic or Bennett meters, to set LPG compensation and motor spirit without correction, set digit 1=4.

For COM125 optical meters when motor spirit correction is required as well, set digit 1=6.

Refer Setting the Configuration Code (see page 16)

Setting the Configuration Code

Refer to Figure 3. While setting the configuration code, the price display shows 'C' and the volume display shows 'XXXXX'.
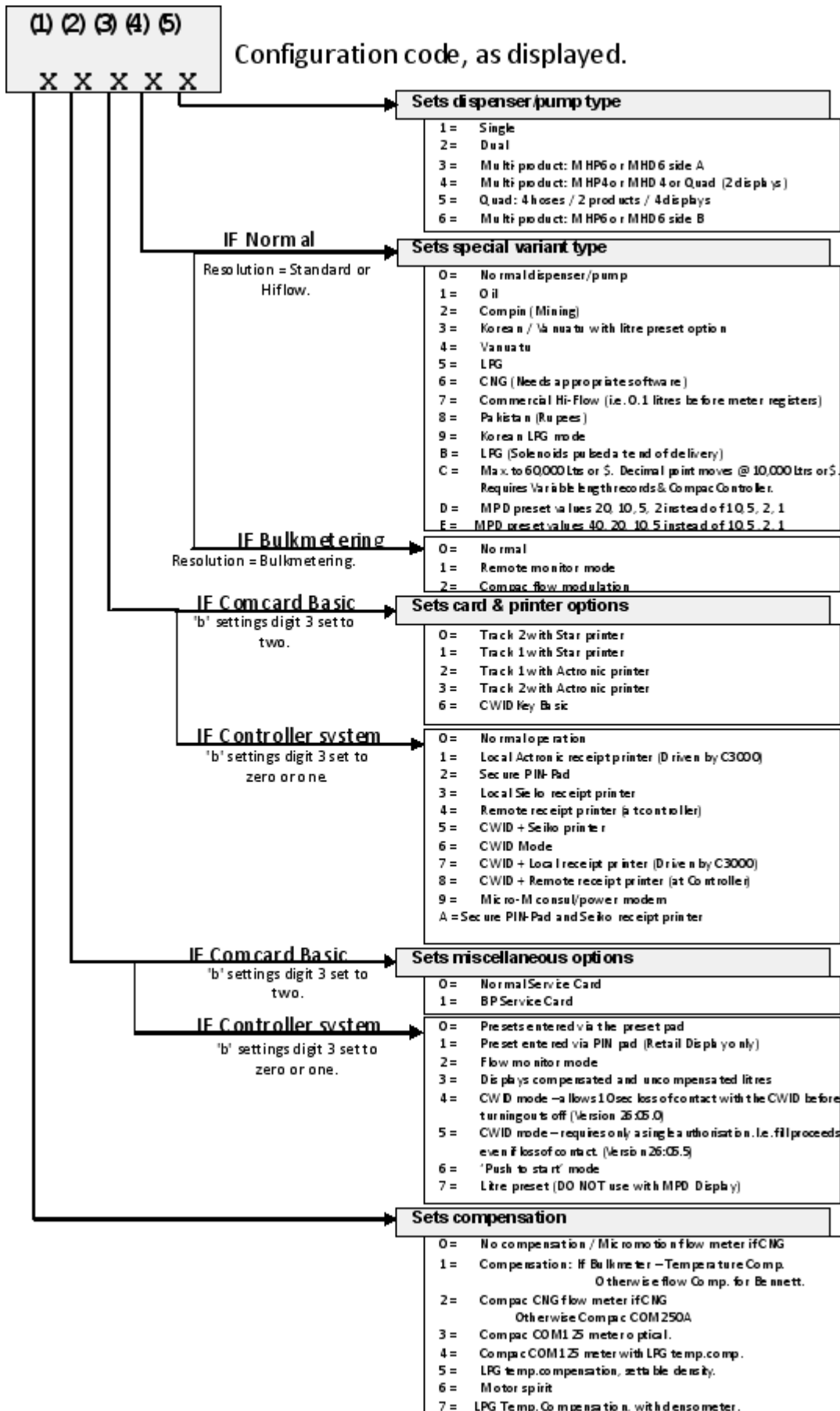
(1) (2) (3) (4) (5)

X X X X X

Configuration code, as displayed.

Sets dispenser/pump type

1 =	Single
2 =	Dual
3 =	Multi product: MHP6 or MHD6 side A
4 =	Multi product: MHP4 or MHD4 or Quad (2 displays)
5 =	Quad: 4 hoses / 2 products / 4 displays
6 =	Multi product: MHP6 or MHD6 side B

IF Normal
Resolution = Standard or Hiflow.

Sets special variant type

0 =	Normal dispenser/pump
1 =	Oil
2 =	Compin (Mining)
3 =	Korean / Vanuatu with litre preset option
4 =	Vanuatu
5 =	LPG
6 =	CNG (Needs appropriate software)
7 =	Commercial Hi-Flow (i.e. 0.1 litres before meter registers)
8 =	Pakistan (Rupees)
9 =	Korean LPG mode
B =	LPG (Solenoids pulsed at end of delivery)
C =	Max. to 60,000 Lts or $. Decimal point moves @ 10,000 ltrs or $. Requires Variable length records & Compac Controller.
D =	MPD preset values 20, 10, 5, 2 instead of 10, 5, 2, 1
E =	MPD preset values 40, 20, 10, 5 instead of 10, 5, 2, 1

IF Bulkmetering
Resolution = Bulkmetering.

0 =	Normal
1 =	Remote monitor mode
2 =	Compac flow modulation

IF Comcard Basic
'b' settings digit 3 set to two.

Sets card & printer options

0 =	Track 2 with Star printer
1 =	Track 1 with Star printer
2 =	Track 1 with Actronic printer
3 =	Track 2 with Actronic printer
6 =	CWID Key Basic

IF Controller system
'b' settings digit 3 set to zero or one.

0 =	Normal operation
1 =	Local Actronic receipt printer (Driven by C3000)
2 =	Secure PIN-Pad
3 =	Local Seiko receipt printer
4 =	Remote receipt printer (at controller)
5 =	CWID + Seiko printer
6 =	CWID Mode
7 =	CWID + Local receipt printer (Driven by C3000)
8 =	CWID + Remote receipt printer (at Controller)
9 =	Micro-M consul/power modem
A =	Secure PIN-Pad and Seiko receipt printer

IF Comcard Basic
'b' settings digit 3 set to two.

Sets miscellaneous options

0 =	Normal Service Card
1 =	BP Service Card

IF Controller system
'b' settings digit 3 set to zero or one.

0 =	Presets entered via the preset pad
1 =	Preset entered via PIN pad (Retail Display only)
2 =	Flow monitor mode
3 =	Displays compensated and uncompensated litres
4 =	CWID mode – allows 10sec loss of contact with the CWID before turning outs off (Version 26:05.0)
5 =	CWID mode – requires only a single authorisation. I.e. fill proceeds even if loss of contact. (Version 26:05.5)
6 =	'Push to start' mode
7 =	Litre preset (DO NOT use with MPD Display)

Sets compensation

0 =	No compensation / Micromotion flow meter if CNG
1 =	Compensation: If Bulkmeter – Temperature Comp. Otherwise flow Comp. for Bennett.
2 =	Compac CNG flow meter if CNG Otherwise Compac COM250A
3 =	Compac COM125 meter optical.
4 =	Compac COM125 meter with LPG temp.comp.
5 =	LPG temp.compensation, settable density.
6 =	Motor spirit
7 =	LPG Temp. Compensation, with densometer.

Figure 3 Configuration Code Options

'b' Settings

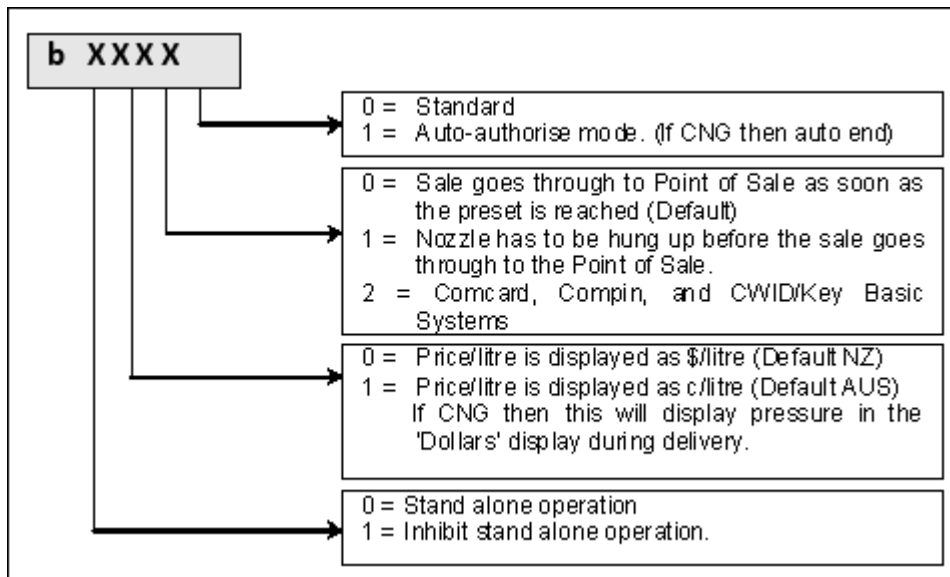While setting the 'b' settings, the price display shows 'b' and the volume display shows 'bXXXX'.

Figure 2 'b'Settings

Auto Authorise (Digit 4)

0:       If digit 4 is set to zero, then the pump/dispenser software defaults to conventional operation, (i.e. the nozzle switch controls the pump start after initial authorisation).

1:       If digit 4 is set to one, then the dispenser/pump software will run in the AUTO AUTHORISE mode of operation (used for wharf & aviation or any other sites where the hose reel is remote from the pump unit):

- The pump/dispenser will start automatically after it has been initialised by the card-reader or remotely by a Compac controller.
- The dispenser/pump will switch off after four minutes if flow does not commence.
- The pump/dispenser will switch off XXX * seconds after flow rate stops.
- Can be adjusted to clients' requirements, between 1 and 256 seconds
- The nozzle switch becomes a shut-off switch (i.e., the nozzle switch can be replaced with a stop pushbutton or normally closed toggle switch).

⚠NOTE   *In AUTO AUTHORISE mode the nozzle input must be shorted out.*

Transaction Data (Digit 3)

0:       If digit 3 is set to zero, the system will function as a conventional dispenser/pump and the sale data goes through to Point of Sale as soon as the preset is reached. This is the default setting.

1:       If digit 3 is set to one, the system will function as a convention dispenser/pump but the sale data will go through to the Point of Sale only after the nozzle has been hung up.

2:       With digit 3 set to two, the head is set up for Comcard Basic, Compin Basic, or CWIDKey Basic, which are self-contained systems operating independently of any controller.

To operate, a card-reader/CWIDKey reader must be plugged into the 'head' and the correct access code and card/key number validations must be set by the Parameter switch.

⚠ NOTE   *For the Bulk Meter Register, digit 3 must be set to zero or one. Comcard, Compin, and CWIDKey Basic systems are not available in this mode.*

Price per Litre (Digit 2)

0:       If digit 2 is set to zero, the price per litre is displayed as dollars per litre ($0.000)

1:       If digit 2 is set to one, the price per litre is displayed as cents per litre (000.0 cents).

For CNG Only: If digit 2 is set to one then the display that normally shows the dollar value of the transaction, will display the CNG pressure during the fill. At the end of the fill the display will revert to displaying the value.

Controller Option (Digit 1)

The function of this digit (1) depends on whether the head has been set up as one of the Basic Systems (Comcard, Compin, or CWIDKey) or a conventional pump/dispenser, using digit 3.

Basic Systems: (digit 3 set to two)

With all Compac pumps/dispensers, the 'head' will display the dollars and litres grand totals when the nozzle switch is pressed quickly five or more times.

⚠ NOTE   *On a commercial pump/dispenser with litres-only display, only the total litres can be read.*

If the 'head' is set-up as a Comcard, Compin, or CWIDKey Basic system then, after displaying the grand totals as above, the head will also printout the totals for each card/pin/key, irrespective of the digit 1 setting.

By setting digit 1 to one, the 'Scrolling Totes' option is selected. Refer Displaying and Printing Totals (see page 41). In this mode of operation, after printing the totals as above, the 'head' will flash card totals on the pump's main display. All non zero card totals are displayed consecutively, for 10 seconds each.

⚠ NOTE   *The totals can only be zeroed by replacing the memory chip.*

Conventional Pump/Dispenser (digit 3 set to zero or one)

If digit 1 is zero, the pump/dispenser can be operated in 'stand-alone' mode irrespective of the pump/dispenser number loaded.

If digit 1 set to one, the pump/dispenser will not work in 'stand-alone' mode, (i.e., it requires initialisation from a controller).

⚠ NOTE   *The pump/dispenser ceases to work in 'stand-alone' mode if digit 1 is set to zero and it is connected to a controller. Generally on retail forecourts, this switch should be left off. Hence, if the forecourt controller breaks down, the dispensers/pumps can be set to work in the 'stand-alone'*

mode simply by turning them OFF for 1 minute minimum, then back ON.

However, for unattended situations (e.g. truck stops), the pumps must not be left able to work in the 'stand-alone' mode in case of a controller failure. Therefore, digit 1 should always be set to one for unattended operation. For the Bulk Meter Register configuration, when digit 1 is zero, the unit will work in the 'stand-alone' mode. When digit 1 is one, the unit must be connected to a Compac Central Controller.

C4000 Set-up

The 'K' Factor switch is located on the C4000 PCB as shown in Figure 1. The 'K' Factor switch is used to access and change various set-up options of the C4000 head. The following charts detail the operation of setting up the C4000 head:

Any change of set-up made by the 'K' Factor switch takes effect as soon as the C4000 resets. The power supply does not have to be interrupted.

Set up of the C4000 must be done in the following sequence:

'K' Factor Switch Settings - starting with configuration setting and moving back through the options to the K Factor setting:

K Factor Switch Settings

Setting	Price Display	Litres Display	Reference
Configuration Code	'C'	'XXXXX'	Refer Configurations C4000 (see page 13)
Display Resolution	'Sr'	'Sr X.XX'	Refer Display (Litres) Resolution (see page 26)
Temperature	'E'	'E XXX.X'	Refer Temperature Calibration (see page 31) LPG and Bulk-metering only
ACV Flow rate	'FLO'	'r XXXX'	Refer ACV Valve Flow Rate (see page 31)
Density Calibration	'LP6'	'00000'	Refer Calibrating Specific Density (see page 30)LPG only.
No-flow cut-off	'n'	'n XXX'	Refer No Flow Cut-Off Timer C4000 (see page 25)
Solenoid delay	'Sd'	'd XXX'	Refer Solenoid Delay (see page 27)
Preset Cut-Off	'PCut'	'PC X.XX'	Refer Pre-Set Cut-Off (see page 28)
'b' settings	'b'	'b XXXX'	Refer 'b' Settings (see page 18)
'K' Factor	'F', 'Fb', 'F1', 'F2', or 'F3'	'X.XXXX'	Refer Setting the 'K'Factor (see page 24)
H-Cut	'HCut'	'HXXXX'	Refer H-Cut (see page 31) Bulk-metering only
L-Cut	'LCut'	'LXXXX'	Refer L-Cut (see page 31) Bulk-metering only
F-Cut	'FCut'	'FXXXX'	Refer F-Cut (see page 32) Bulk-metering only
Density Factor	'dSF'	'X.XXXX'	Refer Product Density Factor (see page 29) CNG only

⚠NOTE   *The K Factor setting should be done last of all (i.e. until parameter switch settings are made, the pump/dispenser may not be operational, and so a calibration fill may not be possible).*

'K'Factor Switch

Using the 'K' Factor Switch

Using the 'K' Factor Switch to Change a Setting

Step	ACTION	RESULT
1	Ensure that the nozzles are hung up	Dispenser in idle state
2	Press and release the 'K' Factor switch, in quick succession, until the desired setting is displayed.	The price display and volume display indicates the desired setting. See following paragraphs.
3	Press and hold the 'K' factor switch.	A digit, of the displayed setting, will begin to increment.
4	When the digit is correct, release the 'K' Factor switch.	
5	Repeat steps 3 and 4 for each digit of the setting	⚠NOTE The C4000 will reset itself if the 'K' factor switch is left for more than 10 seconds.
	Continue for multiple hose units, if appropriate.	
6	Press and release the 'K' factor switch 8 or more times in quick succession	The setting for side "B" (or hose 2, 3, or 4) is displayed.
7	Repeat steps 3 to 5 above.	

⚠NOTE *The C4000 will reset at any stage during the 'K' Factor operation if the switch is not pressed for ten (10) seconds. If the C4000 resets out of any field before the numbers have been set correctly, then that field must be entered again to ensure the details are correct.*

⚠NOTE *The K-Factor switch must be sealed with a lead or paper seal after commissioning.*

Calibration ('K') Factor

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

Below is the method of calibration, including how to calculate the new 'K' Factor and how to enter it in the C4000 memory.

(See also Encoder (see page 54) for more information on the encoder/pulser)

Calibration

To calibrate the dispenser/pump, dispense fuel into a certified measuring container, and compare the display value with the amount dispensed.

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.

$$New \text{ 'K' Factor} = Existing \text{ 'K' Factor} \times \frac{\text{Dispensed Amount}}{Displayed\ Amount}$$

$$= \text{Existing 'K' Factor} \times \frac{20.00}{10.00}$$

$$= \text{Existing 'K' Factor} \times 2$$

Change the existing "K" factor to this value

Setting the Calibration 'K'Factor

Refer to C4000 Set-Up K Factor Switch Settings (see page 21) The
displays will indicate as below

Type		Price Display indication	Volume Display Indication
Single Hose		'F'	'X.XXXX'
Dual Hose	Side "A"	'F'	'X.XXXX'
	Side "B"	'Fb'	
Quad or Multi-product	Hose 1	'F1'	'X.XXXX'
	Hose 2	'F2'	
	Hose 3	'F3'	
	Hose 4	'F4'	

⚠NOTE _Once the dispenser/pump resets with the correct 'K' factor
entered, the display will show the new volume unless the 'head' is in
"Compensation Mode", in which case the display volume will not change._

⚠NOTE _Be careful when calibrating dual or multi-hose pumps &
dispensers to ensure that the correct 'K' factor is being changed._

No Flow Cut-Off Timer

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

- Returning the nozzle to its holder.
- Reaching the preset amount entered.
- Cut out on the 'No flow cut-off timer'.

The No Flow Cut-off Timer sets the amount of time the dispenser/pump will allow a sale to continue when no flow is detected. This timer applies at both the beginning fill before filling commences and at the end of the fill after flow has stopped. The No Flow Cut-off Timer is terminated if the nozzle is returned to its holster.

The range available is between 1 & 256 seconds. The default setting is 'n0000' (256 seconds).

Setting the No Flow Cut-Off Timer

Refer to C4000 Set-Up K Factor Switch Settings (see page 21).While setting this value the price display will indicate 'n' and the volume display will indicate 'nXXXX'.

Display (Litres) Resolution

For standard dispenser/pumps, high flow dispenser/pumps & bulk metering, different resolutions are often required:

Display Resolution	Sr setting on k factor switch	Litres Display resolution	Max presetable or fill amount
Standard (default)	0.000	0.00	970 L
Hi-Flow	0.00	0.00	9700 L
Bulk-metering	0.0	00000.0	
	0	000000	
		000000[0] [0] is not displayed	

⚠ NOTE   *As well as displaying the decimal point, a full colon will show on the display after 'power on', until the first transaction is started (i.e. the display shows ':0.0' until the first new transaction begins).*

The display resolution does not affect the price display, which will always display to a resolution of 0.01 dollars.

Setting the Display Resolution

Refer to C4000 Set-Up K Factor Switch Settings (see page 21)

Step	ACTION	RESULT
1	Ensure that the nozzles are hung up	Dispenser in idle state
2	Press and release the 'K' Factor switch continuously until the Litres resolution is displayed	The price display indicates 'Sr' and the Litres Resolution is displayed as "0.00" (standard resolution on 5-digit display)
3	Press and hold the 'K' factor switch.	The decimal point will begin to move.
4	When the resolution (decimal point) is correct, release the 'K' Factor switch.	⚠ NOTE The C4000 will reset itself if the 'K' factor switch is left for more than 10 seconds.

Solenoid Delay

The Solenoid Delay was installed in the program to enable the "delay" between the submersible pump operating and the dispenser solenoids operating to be controlled on initial start-up. This setting should only be set on dispensers.

This setting should never be set more than 4-6 seconds. Its main purpose is to allow the leak detector on the submersible pump to carry out its leak test.

The default setting is 'd0000' (i.e., no delay). All dispensers with a self-contained pump should be left at the default setting.

Setting the Solenoid Delay

Refer to C4000 Set-Up K Factor Switch Settings (see page 21). While setting this value, the price display will indicate 'Sd' and the volume display will indicate 'dXXXX' where X equals one second.

Pre-Set Cut-Off

Prior to the dispenser reaching its preset amount, the solenoids are switched to give a low flow rate. The "preset cut-off" sets the amount (in litres), prior to the preset amount being attained, at which the solenoids will switch to a low flow rate.

With the value set to 0.00, the default values are used. These are:

- LPG 0.75
- Oil 0.05
- Other products 0.32

The Preset Cut-off is calculated as follows:

[Price per Litre] X [over-run (displayed as a dollar value)] + default value as above.

Example:

Price per Litre = $0.96

Dollar amount of fuel required = $20.00

After delivery price display shows: $20.01 ($0.01 is the over-run dollar value)

New preset = (0.96 x 0.01) + 0.32 (Other Products) = 0.3296

0.3296 rounded up = 0.33

New preset cut-off to be entered is 0.33.

Setting the Pre-Set Cut-Off

Refer to C4000 Set-Up K Factor Switch Settings (see page 21) The Price display shows 'PCut' and the volume display shows 'PCX.XX'. The range is from 0.01 to 9.99 litres.

Further Settings Available on the 'K' Factor Switch

The following configurations (K-Factor) switch settings are only available for CNG dispensers, LPG dispensers, or bulk meter registers. As they are reasonably uncommon, they have not been included in sequence with the four more common settings.

These 'uncommon' settings are:

- Density Factor 'dSF' - CNG (needs appropriate software)
- Temperature'E'- LPG (with compensation) – Bulkmeter
- ACV Valve Flow rate 'FLO' - Bulkmeter
- L Cut 'L' - Bulkmeter
- H Cut'H' - Bulkmeter
- F Cut 'F' - Bulkmeter
- Specific Density Calibration 'LP6' - LPG (with compensation and with densometer).

Product Density Factor

Setting the Product Density Factor

Refer to C4000 Set-Up K Factor Switch Settings (see page 21) While setting the Product density factor, the price display shows 'dSF' ('dFb' for side "B") and the volume display shows 'X.XXXX'.

Specific Density (With a densometer)

This setting is only available for LPG dispensers with a densometer and set-up for LPG with temperature compensation (configuration code = 7xx5x). This is not available in other modes.

⚠ NOTE   *For Bulkmeter modes (Sr=0) and LPG dispensers with temperature compensation but without a densometer (configuration code = 5xx5x), the density must be set at the dispenser.*

The specific density of the LPG is measured to allow the C4000 to accurately convert the amount of LPG dispensed to the LPG dispensed @ 15ºC. The specific density of the product is measured using the Compac densometer and is corrected to specific density at 15ºC. It is always displayed in units of kg/m3.

Calibrating Specific Density (Densometer)

To accurately calibrate the densometer the temperature reading must be correct. Always calibrate the temperature before calibrating the density.

Using the 'K' Factor switch to calibrate the densometer:

Step	ACTION	RESULT
1	Ensure that the nozzles are hung up	Dispenser in idle state
2	Press and release the 'K' Factor switch, in quick succession, until 'LP6' is displayed in the price display.	The volume display indicates '00000'.
3	Press and hold the 'K' factor switch.	A digit, of the volume display, will begin to increment.
4	When the digit is correct, release the 'K' Factor switch.	
5	Repeat steps 3 & 4 until the volume display reads 1.	The volume display indicates 00001.
5	Press and release the 'K' Factor switch, in quick succession, until 'den' is displayed in the price display.	The LPG pump will start and the volume display indicates the specific density @ 15ºC.
6	Press and hold the 'K' factor switch.	A digit, of the displayed setting, will begin to increment.
7	When the digit is correct, release the 'K' Factor switch.	
8	Repeat steps 6 & 7 until the volume display reads the correct density as measured by a hydrometer and corrected to 15ºC.	The volume display indicates the correct specific density.

⚠ NOTE   *The C4000 will reset itself if the 'K' factor switch is left for more than 10 seconds.*

Pressure does have a small effect on density so you will notice that the LPG pump will run while the density is being calibrated. This ensures that the density is always being measured and calibrated at approximately the same pressure.

Temperature Calibration

Only available for LPG and Bulk-meter modes and only if the Temperature Compensation PCB is installed and temperature compensation configured as detailed in Section 0

To set the temperature, place the probe in product of a known temperature. Allow 10 minutes for the probe temperature to stabilise, then adjust the temperature setting in the register 'XXX.X' to the known temperature value.

To check operation of the probe, press the 'K' factor switch to observe E in the Price display and 'XXX.X' in the volume display. Allow the display to return to normal. Warm the probe and recheck the K-Factor switch temperature setting. The new temperature should be displayed.

⚠ NOTE   The temperature is not updated while it is being displayed.

Setting the Temperature

Refer to K Factor Switch Settings (see page 21) While setting the temperature, the price display shows E and the volume display shows 'XX.X'. The temperature is displayed in degrees Celsius.

ACV Valve Flow Rate

This is only available in Bulk Meter mode where the ACV Valve has 'Compac Designed' controls. The Configuration code must be set-up for "Compac flow modulation" (4th digit set to 2. Refer to Configuration Code (see page 16))

Setting ACV Valve Flowrate

Refer to K Factor Switch Settings (see page 21) While setting the ACV Valve flowrate, the price display shows 'FLO' and the volume display shows 'rXXXX'. The desired flowrate for the system must be entered in litres per minute.

L-Cut

This is only available in Bulk-meter mode.

This value is similar to the preset cut-off used in a standard dispenser. Prior to the delivery reaching its preset amount, the solenoids are switched to give a low flowrate. The "L-Cut" sets the amount (in litres), prior to the preset amount being attained, at which the solenoids will switch to a low flow rate.

Setting L-Cut

Refer to K Factor Switch Settings (see page 21) While setting the "L-Cut", the price display shows 'LCUT' and the volume display shows 'LXXXX'.

H-Cut

This is only available in Bulk Meter mode.

This value is the desired cut-off point to half flow (in litres) for the system. The "H-Cut" sets the amount (in litres), prior to the preset amount being attained, at which the flow rate of the system will be halved.

Setting H-Cut

Refer to K Factor Switch Settings (see page 21) While setting the "H-Cut", the price display shows 'HCUt' and the volume display shows 'HXXXX'.

F-Cut

This is only available in Bulk Meter mode.

This is the final cut-off point to pre-set (in litres) 'FXXX.X' for the system.

Setting F-Cut

Refer to K Factor Switch Settings (see page 21) While setting the "F-Cut", the price display shows 'FCut' and the volume display shows 'FXXXX'.

Parameter Switch

Refer to Figure 1 Main Features C4000 (see page 12) to find the location of the parameter switch.

The Parameter switch has several functions including:

- Identifying the software programme version number, 'P XX'

- Setting the dispenser/pump price, 'Pr' or 'P'

- Setting the product density, 'dEn' (Bulkmeter Registers and LPG with compensation but without a densometer only)

- Setting the pump/dispenser number, 'Pn'

- Displaying End of Sale indications

- Setting the dispenser sequencing rate, 'SE9' (CNG only)

- Validating and invalidating cards/pins/keys, 'Y' or 'n' (Comcard, Compin, or CWIDKey pumps/dispensers only)

- Setting the card access code, 'A' (Comcard or CWIDKey pumps/dispensers only)

- Conducting Display Segment Test

⚠ NOTE   *Parameter Switch Settings - all must be set, but the order of the set-up is not critical.*

Program Version Number

To determine program version number, hang up the nozzle, then push the parameter switch 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 'PXX' where 'XX' is the program version number.

Setting the Price per Litre

The C4000 processor board can be set for five hose configurations:

1. Single (e.g. one C4000 controls one hose)

2. Dual (e.g. one C4000 controls two hoses)

3. Quad (e.g. one C4000 controls four hoses but only two (one per side) can operate at any time)

4. True Quad (e.g. one C4000 controls four hoses which can all operate at once)

5. Six (e.g. one C4000 controls six hoses but only two can operate at once)

The following charts are to be used to set the price.

Setting Price for a Single or Dual Hose Configuration

Step	ACTION	RESULT
1	Ensure that the nozzle is hung up	Dispenser in idle state
2	Press and Hold the Parameter switch operated until the "Price per litre" is displayed.	The Price for side 'A' is displayed as 'PX.XXX' and 'Pr' is displayed on the price display.
3	Press and hold the Parameter switch.	A digit, of the displayed 'Price per litre', will begin to increment.
4	When the digit is correct, release the Parameter switch.	
5	Repeat steps 3 and 4 for each digit of the 'Price per litre'.	⚠ NOTE *The C4000 will reset itself if the Parameter switch is left for more than 60 seconds.*
Continue for Dual hose units		
6	Press and release the Parameter switch 8 or more times in quick succession	The 'Price per litre' for side "B" is displayed as 'bX.XXX' and 'Pr" is displayed on the price display.
7	Repeat steps 3 to 5 above.	

⚠ NOTE

- If a Compac Central Controller, EFTPEC, Task forecourt controller, or Compac Commander is used, the price must be set to zero (0) at the pump/dispenser. The price can then be set at the Controller. This applies to all configuration display options.

- The dispenser/pump will stop when the dollar amount reaches: $999.99 (high-flow $9999.9) or the litre amount reaches 999.99l (high-flow 9999.9l) whichever occurs first.

- 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.

Setting the Price for Quad (four) Hose Configuration

Step	ACTION	RESULT
1	Ensure that the nozzles are hung up	Dispenser in idle state
2	Press and Hold the Parameter switch operated until the "Price per litre" is displayed.	The Price for hose 1 is displayed as 'PX.XXX' and 'Pr1' is displayed on the price display.
3	Press and hold the Parameter switch.	A digit, of the displayed 'Price per litre', will begin to increment.
4	When the digit is correct, release the Parameter switch.	
5	Repeat steps 3 and 4 for each digit of the 'Price per litre'.	⚠ NOTE *The C4000 will reset itself if the Parameter switch is left for more than 60 seconds.*
Continue for other hoses		
6	Press and release the Parameter switch 8 or more times in quick succession	The 'Price per litre' for the next hose is displayed as 'PX.XXX'. 'Pr2', Pr3' or 'Pr4' is displayed on the price display.
7	Repeat steps 3 to 5 above.	

⚠ NOTE   *If a Compac Central Controller, EFTPEC, Task forecourt controller, or Compac Commander is used, the price must be set to zero (0) at the pump/dispenser. The price can then be set at the Controller. This applies to all configuration display options.*

⚠ NOTE   *The dispenser/pump will stop when the dollar amount reaches: $999.99 (high-flow $9999.9) or the litre amount reaches 999.99l (high-flow 9999.9l) whichever occurs first.*

Setting the Price for True Multi-Product Configuration

Step	ACTION	RESULT
1	Ensure that the nozzles are hung up	Dispenser in idle state
2	Press and Hold the 'Side A' Parameter switch until the "Price per litre" is displayed.	The Price for hose 1 side 'A' is displayed as 'PX.XXX' and 'Pr1' is displayed on the price display.
3	Press and hold the Parameter switch.	A digit, of the displayed 'Price per litre', will begin to increment.
4	When the digit is correct, release the Parameter switch.	
5	Repeat steps 3 and 4 for each digit of the 'Price per litre'.	⚠ NOTE *The C4000 will reset itself if the Parameter switch is left for more than 60 seconds.*
Continue for each hose		
6	Press and release the Parameter switch 8 or more times in quick succession	The 'Price per litre' for the next hose on side 'A' is displayed as 'PX.XXX'. 'Pr2' or 'Pr3' is displayed on the price display.
7	Repeat steps 3 to 5 above.	
Continue for side "B"		
8	Repeat steps 1 to 7 for side "B"	

⚠ NOTE *If a Compac Central Controller, EFTPEC, Task forecourt controller, or Compac Commander is used, the price must be set to zero (0) at the pump/dispenser. The price can then be set at the Controller. This applies to all configuration display options.*

⚠ NOTE *The dispenser/pump will stop when the dollar amount reaches: $999.99 (high-flow $9999.9) or the litre amount reaches 999.99l (high-flow 9999.9l) whichever occurs first.*

Setting the Product Density

Only available in Bulkmeter mode (when Sr = 0) or LPG with compensation but without a densometer (configuration code of 5xx5x).

The product density (kg/m3) must be set. In bulkmeter mode this can be done either at the register (for 'stand-alone' C4000 Heads), or at the central controller. For controller sites the density entered at the register must be zero to allow the 'controller set' density to override. On LPG dispensers, the product density (kg/m3) is set at the dispenser.

If the C4000 is in Bulkmeter mode or set-up for LPG with temperature compensation but without a densometer (Configuration code = 5xx5x) then the density can be set using the parameter switch.

⚠ NOTE   This is not available in other modes.

While setting the Specific Density, the price display shows 'dEn' and the volume display shows 'XXX.X' the density (Kg/m3) @ 15ºC.

Setting Specific Density (Settable density)

Step	ACTION	RESULT
1	Ensure that the nozzles are hung up	Dispenser in idle state
2	Press and release the Parameter switch, in quick succession until the density is displayed.	The price display (top) shows 'dEn' and the volume display shows the density 'XXX.X' in kg/m3 @ 15ºC
3	Press and hold the Parameter switch.	A digit, of the density, will begin to increment.
4	When the digit is correct, release the Parameter switch.	
5	Repeat steps 3 and 4 for each digit of the density.	⚠ NOTE *The C4000 will reset itself if the Parameter switch is left for more than 60 seconds.*

⚠ NOTE   *The same density is used for all hoses on a multi-hose dispenser.*

Setting the Dispenser/Pump Number

Press and release the Parameter switch nine (9) or more times and the message 'Pn' will appear on the Price (top) display. The number displayed in the volume (middle) display is the pump number. Press and hold the parameter switch and the processor will roll the displayed number until the switch is released. The value of the displayed number will then be stored as the pump/dispenser number.

Displaying the End of Sale Indications

Press and release the Parameter switch nine (9) or more times and the message 'Pn' will appear on the 'Price' (top) display. The number displayed in the 'volume' (middle) display is the pump number and the number displayed in the 'price per litre' (bottom) display is the 'end of sale' indicator.

Setting the Sequencing Rate

This is only available for CNG Dispensers.

⚠ NOTE   *Needs appropriate software.*

The rate of sequencing between pressure banks for the CNG dispensers is done on a percentage basis. There are three percentage settings to choose from:

Fast, 'FAS' switching to the next higher-pressure bank occurs at 45% of the full flow rate.

Normal, 'nOr' switching to the next higher-pressure bank occurs at 35% of the full flow rate.

Slow, 'SLO' switching to the next higher-pressure bank occurs at 25% of the full flow rate.

To set the Sequencing rate

Press and release the Parameter switch seventeen (17) or more times, without holding it depressed for long enough to change any digits, until 'SE9','XXX' appears. Hold the switch depressed until the correct sequencing rate is displayed, then release.

The displayed sequencing rate is now selected and operation of the dispenser will be affected immediately. The displays will reset after a ten (10) second timeout.

Validating/Invalidating Cards Pins or Keys

This is only available on Comcard Basic, Compin Basic, or CWIDKey Basic systems (i.e. 'b' setting digit 3 = 2.

1.   Ensure that the nozzle is hung up. Press the Parameter switch 16 or more times without holding the switch depressed long enough for any digits to change or for the system to enter the pump number setting mode. The switch must be depressed for two seconds or longer for the latter to occur. Card status information will then appear on the litre display panel. The left of the display panel shows a 'Y' or 'n' where 'Y' is Valid & 'n' is Invalid; the right of the panel shows the two-digit card, pin, or key number.

2.   The desired card/pin/key number can be selected by changing each digit using the usual press/hold/release method with the Parameter switch. When the figure on the left side of the display panel is selected, it can be changed from 'n' to 'Y' to 'n' etc. by holding the Parameter switch depressed. Therefore, the respective card status can be selected by releasing the switch when the desired card status symbol is displayed.

To change multiple cards repeat the above process for the appropriate card numbers. The display will return to normal operation after the Parameter switch is not operated for ten (10) seconds.

⚠ NOTE   *On older systems Card 99 is the Service card and was universally accepted by all Comcard card-readers.*

Setting the Access Code

This is only available on Comcard or CWIDKey Basic systems (i.e. 'b' setting digit 3 = 2.

⚠ NOTE   *Compin does not require any Access Code.*

Depress the Parameter switch 24 or more times, without holding it depressed long enough to change any digits, until 'AXXXX' appears on the

display. This number is different for each Compac Card/Key System, which ensures that the cards/keys for any one system cannot be used on any other systems.

The access code can be changed by the usual press/hold/release method using the Parameter switch.

⚠ NOTE   Access Code will only need to be changed to prevent an existing Card/Key System being used, or to allow a new card system to be issued in the case of several lost or stolen cards. Refer also to Displaying and Printing Totals (see page 41)

Printer Set-up

Comcard Compin & CWIDKey Basic Systems

The printer used is the Star printer, with modifications. Recessed in the left side of the printer are two (2) banks of dipswitches. The switches are UP when set to ON (see diagram below).

Figure 4. Star Printer Dipswitch Settings

The cable used to connect the printer to the pump/dispenser is supplied by Compac. One end has a 25 way 'D' connector, with an interface PCB within the 'D' connector housing.

The other end is a four pin AMP connector where:

- Pin 1 - Red
- Pin 4 - Black

Printer Self Test

To carry out the self-test, press and hold down the FEED and ON LINE buttons while switching the power on.

Displaying and Printing Totals

General

To display litre and dollar totals for any single hose on a pump/dispenser, make sure all nozzles are hung up. Then, for pumps/dispensers:

▪ With Preset: Press either the Cancel or the Fill button, on the hoses' respective Preset, five or more times and the totals will appear on the displays.

▪ Without Preset: Remove the nozzle from its holster and hold the nozzle switch in for five seconds. Then press the nozzle switch rapidly five or more times - ensuring that the switch 'clicks' each time. The five digit whole dollar and litre totals will then be shown on the display for ten seconds.

Scrolling Tote Option

This is only available on Comcard, Compin, and CWIDKey Basic systems (i.e. 'b' setting digit 3 = 2)

To access this option the 'b' setting digit 1 must be set to one. Pump/Dispenser totals are accessed as above, then after displaying the pump/dispenser total for ten seconds the card/pin/key number and card/pin/key total will appear. The display will flash for 10 seconds and then go to the next card/pin/key. All cards/pins/keys with non-zero totals and all valid cards/pins/keys will be 'scrolled'.

Using a Totals Only - Report Printer

This is only available on Comcard, Compin, or CWIDKey Basic systems (i.e. 'b' setting digit 3 = 2.)

Plug the two core cable from the printer into the four pin plug (Red Comms - Pin 1, Black Comms - Pin 4) on the side of the pump/dispenser. Power up the printer and make sure it is 'ON LINE'. Then depress the nozzle switch five or more times - ensuring that the switch 'clicks' each time. The printout will contain all cards/pins with non-zero totals and all valid cards/pins/keys.

Card/pin/key status is also displayed on this printout.

The printer may also be permanently wired to the C4000 comms. If the printer is left with the power on and on-line, it will then act as an 'audit trail printer'. It will then print out the card/pin/key number, litres dispensed and the total in dollars, at the end of each fill.

⚠ NOTE   *All totals mentioned above are non-resettable totals (the only way they can be cleared is by replacing the C4000 memory IC 'chip').*

The displays are only capable of displaying five-digit whole litre totals (maximum of 99999), but the C4000 memory stores seven digit whole litre totals (maximum of 9999999.99) for printing

Receipt Printer

With Central Controller and Futra systems, it is possible to install a receipt printer either at the pump/dispenser, or at the Central Controller.

The receipt printout includes the following information: Site Number, Pump Number, Card Number, Reference Number, Date, Time, Product, Litres, Dollars, Dollars per litre, Odometer Reading (if prompted).

Printer Housed at the Pump/Dispenser (Card King)

This is only permissible in 'Type B' fuel pumps/dispensers (as defined by AS2229-1) or in pumps/dispensers used in applications where less stringent requirements are set. This is because the printer is not an intrinsically safe device and must have access to the pump/dispenser exterior for the 'printer paper slot'.

The printer receives the data for printing and cutter operation from the C4000 microprocessor PCB, via an interface PCB (CI125) which also provides the printer with a 12V power supply. The interface PCB provides 'opto-isolation' between the C4000 intrinsically safe circuitry and the 'unsafe' printer circuitry, for the printer driver signal.

This Receipt Printer option is only available for C4000 microprocessors controlling one hose pumps/dispensers, or for C4000s which are set-up in 'True Multi' configuration. A PIN pad must also be connected to the C4000 and the third digit of the Configuration Code must be set to '1' or '3'

▪ On a pump/dispenser set-up with a receipt printer, a receipt is obtained as follows:

   1. Authorise the transaction as for a normal fill until the PIN pad display reads "REQUIRE RECEIPT YES OR NO"

   2. Press   'YES'

   3. The display will read "TAKE FUEL"

Continue the fill as per normal and at the completion of the fill, a receipt will print automatically."

▪ If the nozzle is still in holster:

   1. Pin pad reads: "LOAD PRESET"

   2. Press: "ENTER"

▪ If the nozzle is lifted:

   ▪ Pin pad reads: "TAKE FUEL"

⚠ NOTE   *If the Receipt Printer is not operational (e.g. out of paper), then when the PIN pad displays: "PASS CARD" it will also display:*
        "NO RECEIPT"

Electrical Connection

The data cabling for the printer connects to the C4000 intrinsically safe terminals at connector J14. The other end of these wires connects to connector CON5 on the Interface PCB (CI125).

The 220-240V supply connection on the Interface PCB is at connector CON1.

Power and data connections to the printer and cutter are from CON2 & CON3 on the Interface PCB.

Receipt Printer Connected to the Central Controller

Where a Central Controller is installed on site, it is possible to connect a Receipt Printer to the Central Controller Comms Port 3 to obtain printouts.

Two operational options can be configured at the pump/dispenser C4000 when the Receipt Printer is connected like this:

1. If a Receipt Printer is connected to the Controller and left 'ON LINE', then by setting the third digit of the Configuration Code to '0' or '2' (for standard or Secure PIN pad operation respectively), a receipt will be printed after each transaction. This should be the set-up chosen when a receipt is always required or when the pump/dispenser does not have

a PIN-pad installed.

2.   If the pump/dispenser has a PIN pad connected, then it can be configured to display a receipt prompt as part of the transaction authorisation process. This prompt would be the same as for a pump/dispenser with a Receipt Printer connected to the C4000 (detailed on the previous page).To select this option the third digit of the Configuration Code for the C4000 should be set to '4' or '5', depending upon whether a standard or Secure PIN pad is installed on the pump/dispenser.

Electrical connection of the Receipt Printer in this mode is covered in the Central Controller Service Manual.

Basic Systems (Comcard Compin & CWIDKey)

For these systems to operate the 'b' setting digit 3 must be set to two. Refer 'b' Settings (see page 18). In this mode of operation the 'C4000 Head' operates as a totally self-contained system operating independently of the central controller. The C4000 'Comms' circuitry, which is usually used for communicating with a controller, is now used to run an audit trail and/or receipt printer (Refer Printer Set-up (see page 40)). These systems can have a maximum of 99 cards/pins/keys.

Comcard Basic

The Comcard Basic system uses magstrip cards to initiate a transaction. These cards are encoded with an access number and a card number. There can be only one access number per pump and the card numbers must be in the range of 01 to 99.

⚠NOTE   *In older Comcard basic systems, card number 99 was reserved for servicing.*

All Comcard Basic systems will have a card reader attached to the front or side of the pump/dispenser.

Usually the card number is printed or embossed on the card. If this is not the case the card can be identified in the same manner as the CWIDKey identification procedure.

Compin Basic

The Compin Basic system simply uses a two digit PIN number to initiate a transaction. This operates in the same manner as the Comcard Basic system except that digit 4 of the configuration code (refer Setting the Configuration Code (see page 16)) must be set to two (2). Also there is no access number required. The PIN number acts as the card number and all of the same totals are available.

CWIDKey Basic

The CWIDKey Basic system uses a CWID (Compac wireless Identifier) key to initiate a transaction. These systems have a CWID aerial placed at the nozzle or on the pump/dispenser.

Where the aerial is placed at the nozzle, the CWID tags must be mounted in close proximity to the filling spout. If the aerial is on the dispenser the customer must hold the CWID tag close to the reader panel on the dispenser. The CWID tags are a small (approx. 32mm x 5mm diameter) sealed tag. They do not require batteries.

The CWIDKey Basic system operates in the same manner as the Comcard Basic system except that digit 3 of the configuration code (refer Setting the Configuration Code (see page 16)) must be set to six (6). The CWID tags

are encoded with an access code and a key number in the same way that a comcard is encoded.

CWIDKey Number Identification.

When a valid key is presented to the dispenser the display will alternately flash the key totals then the key number, until the nozzle is lifted. The key number is displayed as "c xx" where xx is the keynumber. The access number is never displayed.

If an invalid key with the correct access code is presented to the dispenser the display will show "----" for one second then the key number for one second.

If a key with an incorrect access code is presented to the dispenser then the display will only show "----" for two seconds.

Electrical Wiring C4000

230 Volt wiring

Power for the C4000 'head' connects to the terminals marked Phase, Neutral, & the Earth Stud.

Refer Connecting Mains Power and Communications (see page 10)

On the C4000 Power supply PCB, the incoming phase feeds the microprocessor power supply through the fuse F2 (250mA) and feeds all low current solid state relay circuits through the fuse F3 (1A).

Solenoids and motors are connected to the appropriate terminals.

Communications (Comms) Wiring

Communication cables connect to the comms terminals marked Red and Black.

Refer Connecting Mains Power and Communications (see page 10)

⚠ CAUTION *The Communications wiring is a 12 volt circuit and any contact with mains will cause permanent damage.*

The C4000 can communicate with the following Forecourt Controllers:

Micro M

Eftpec

Compac Central Controller

Task

Postec

Compac Commander

Comms DIP Switch settings

The Comms dipswitches are on the C4000 power supply PCB. Refer Figure 7 Solid State Relays (Triacs) (see page 60)

Comms Dipswitches	
Sw	Std Comms
1	ON
2	OFF
3	ON
4	OFF
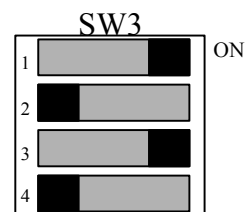
Figure 9. Comms DIP Switch Settings

- Standard Compac Comms (or PEC Comms)
  - Switch 1,3   ON
  - Switch 2,4   OFF
- With Gilbarco consul interface
  - Switch 1,3   OFF

▪ Switch 2,4   ON

C4000 Gilbarco Protocol Converter

A Gilbarco interface board (CI143) plus any software version HIA29107 onwards (or HIU29107 for USA Gilbarco protocol) is required if the C4000 is to connect to a Gilbarco Consul. The Comms dipswitch settings (See Figure 7 & Figure 9) must be set with switches 1& 3 OFF and switches 2 & 4 ON.

The Gilbarco interface board plugs onto the IS Power supply PCB in the Flameproof box. The IS Cable must be setup to connect to the Gilbarco interface board. The Comms still connects to the Red & Black terminals as with the standard Comms.

Intrinsically Safe Wiring

The location of the various connectors are shown in Figure 1. Refer Description C4000

Air Detector Cut-out 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.

	J12	
NSW3	1 — 2	NSW1
GND	3 — 4	GND
GND	5 — 6	GND
NSW0	7 — 8	NSW2
GND	9 — 10	GND
GND	11 — 12	GND
FLOW1	13 — 14	FLOW0
GND	15 — 16	GND
GND	17 — 18	GND
SUMP	19 — 20	AIR2
GNS	21 — 22	GNS
GND	23 — 24	GND
AIR1	25 — 26	AIR0
GNS	27 — 28	GNS
GND	29 — 30	GND
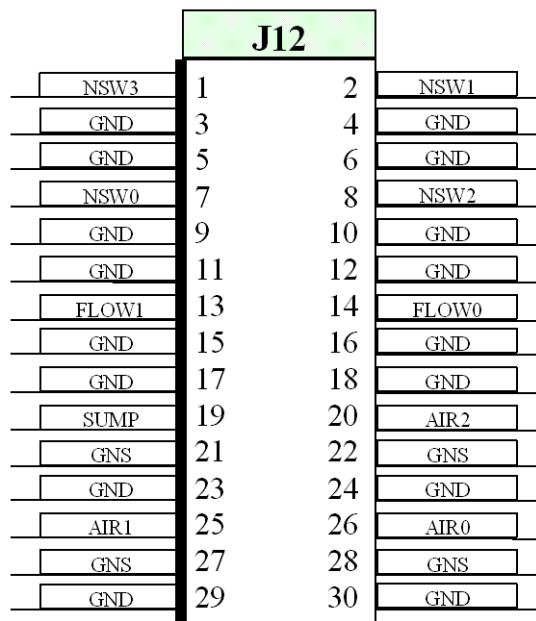
Figure 10. Connector J12 (Nozzle, Air, Sump, and Flow switches)

Nozzle Switch(es)

The nozzle switch leads plug in between 'NSWx' and 'GND' (see Figure 10 above). 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.*

Sump Switch

The Sump Switch is a float switch located in a sump at the bottom of the dispenser. If the dispenser pipe work 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 (see Figure 10). 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.*

Temperature Pressure Compensation PCB (CI075)

The Temperature Compensation PCB is mounted in a separate enclosure and is connected to the C4000 Microprocessor via a four wire cable. The PCB Pin headers and cable connectors are shown below.
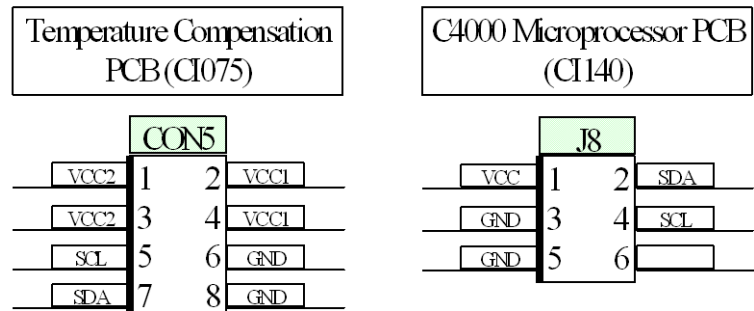
Figure 11. Temperature Compensation Connectors.
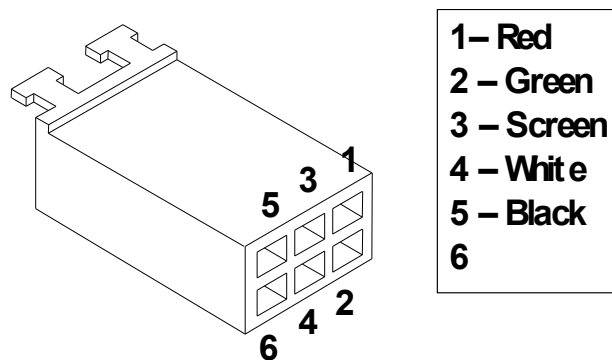
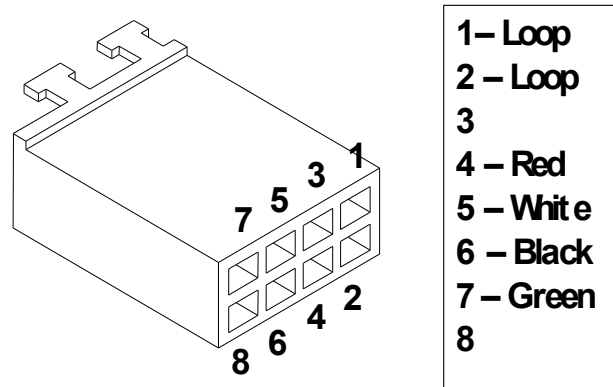Figure 12. Connector to C4000 Microprocessor PCB (J8)

1–	Loop
2 –	Loop
3	
4 –	Red
5 –	White
6 –	Black
7 –	Green
8	

Figure 13. Connector to Temperature Compensation PCB (CON5)

The pressure sensors and temperature sensors supplied by Compac have the appropriate plug to be able to plug them into the Temperature Compensation PCB.

Display Backlighting

The backlighting PCB's consist of several red backlighting LED's and the PCB's are mounted on stand-offs behind the displays.

The backlighting PCB's are supplied from the C4000 'Backlight' plug (J17). This is an intrinsically safe supply.

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.

⚠NOTE   *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.*

Compac Wireless Transceiver

The CWID PCB is mounted in a separate enclosure. Connector 'CON5' on the CWID PCB (see below) connects to J13 on the C4000 Microprocessor PCB (Refer Description C4000) with an eight wire cable (see below)
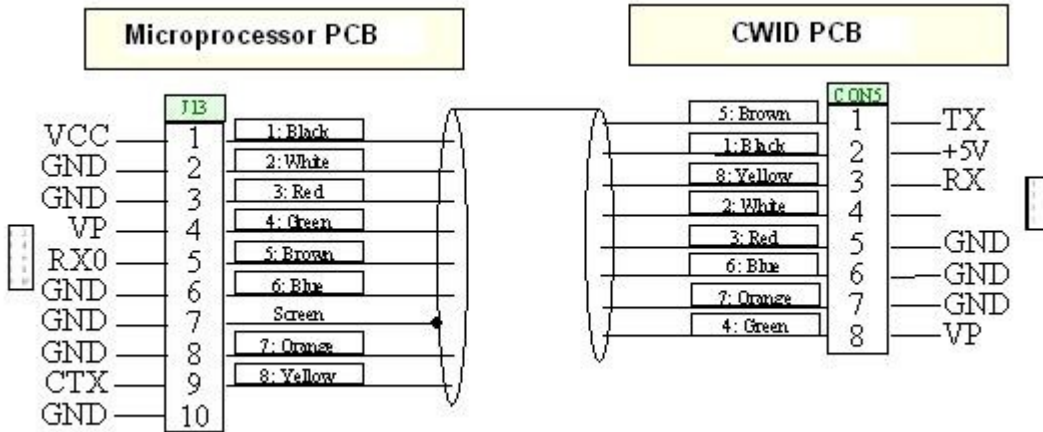

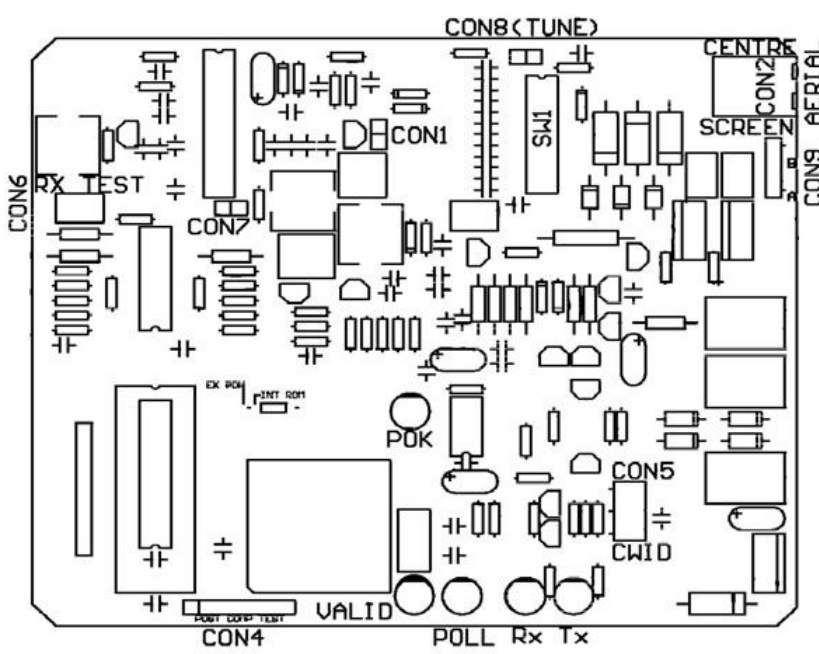Figure 1: CWID (CON5) to microprocessor (J13) cable

Figure 2: CWID (CI 101 issue D) PCB

Tuning the Aerial

Whenever the CWID PCB is changed, the aerial will need to be tuned. For locations of the connectors, refer to the picture in CWID Interface Board Replacement.

1. Connect a Multimeter (set to Volts) to CON8.

2. Place a shorting link across pins 2 & 3 of CON4. The poll LED will flash slower, indicating "Tuning Mode"

3. Using the dipswitches (SW1), adjust the capacitance to obtain the maximum voltage at CON8. Each dipswitch adds a capacitor to the tuned circuit. The DIP switches 1 to 5 are primary capacitors while 6 to 8 are fine tuning capacitors.

4. Use the following technique:

5. Turn on Switch 1 and measure voltage, turn on switch 8 and see if voltage rises or falls. If it rises, turn off 8 and turn on switch 2.

6. Continue this procedure for switches 3,4 and 5 until you get a voltage drop.

7. If the voltage drop occurs at switch 2,3,4 or 5 then return to the previous switch and add switches 6,7 and 8 until the voltage drops. When the drop occurs, revert to the previous switch.

8. If there is no voltage drop as switches 6, 7 and 8 are added, compare this voltage to the voltage achieved at the next primary switch with 6, 7 and 8 turned off.

9. If you can't get a voltage drop when the fine tuning switches are used, use the chart below to calculate a capacitance figure between the switch combination achieved above. For example:If 1+2+6+7+8 (7.3 nF) obtains a higher voltage than 1+2+3 (8.33nF) then try 1+2+5 (7.33 nF) if the voltage reading is higher than the two previous combinations, switch on 8 then 7 then 6 until you get a drop. If no drop is measured then try 1+2+4(7.66 nF). Keep working with combinations until you get the voltage drop when one of the fine tuning switches is added or you have run out of combinations. Always use the setting that achieves the highest voltage.

10. If the voltage drop occurs at step 5, turn off switch 1 and turn on switches 2,3,4 and 5 then test for voltage drop with switch 8. If voltage drops then turn off switch 5, measure voltage and test again with switch 8. Continue with combinations until a voltage drop occurs when one of the fine tuning capacitors is switched on.

11. Though the CWID aerial can work at lower voltages, the voltage reading should be above 28 Volts.

12. Remove the shorting link fitted at 2 above.

13. Test the operation with a valid CWID key.

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

Displays: Litres only, Retail, Multi-price & Preset

The C4000 has a 32 pin connector on the microprocessor PCB (refer General C4000 Figure 1 J7) which can be used to connect up to four display-preset pairs (see Figure 16 below).
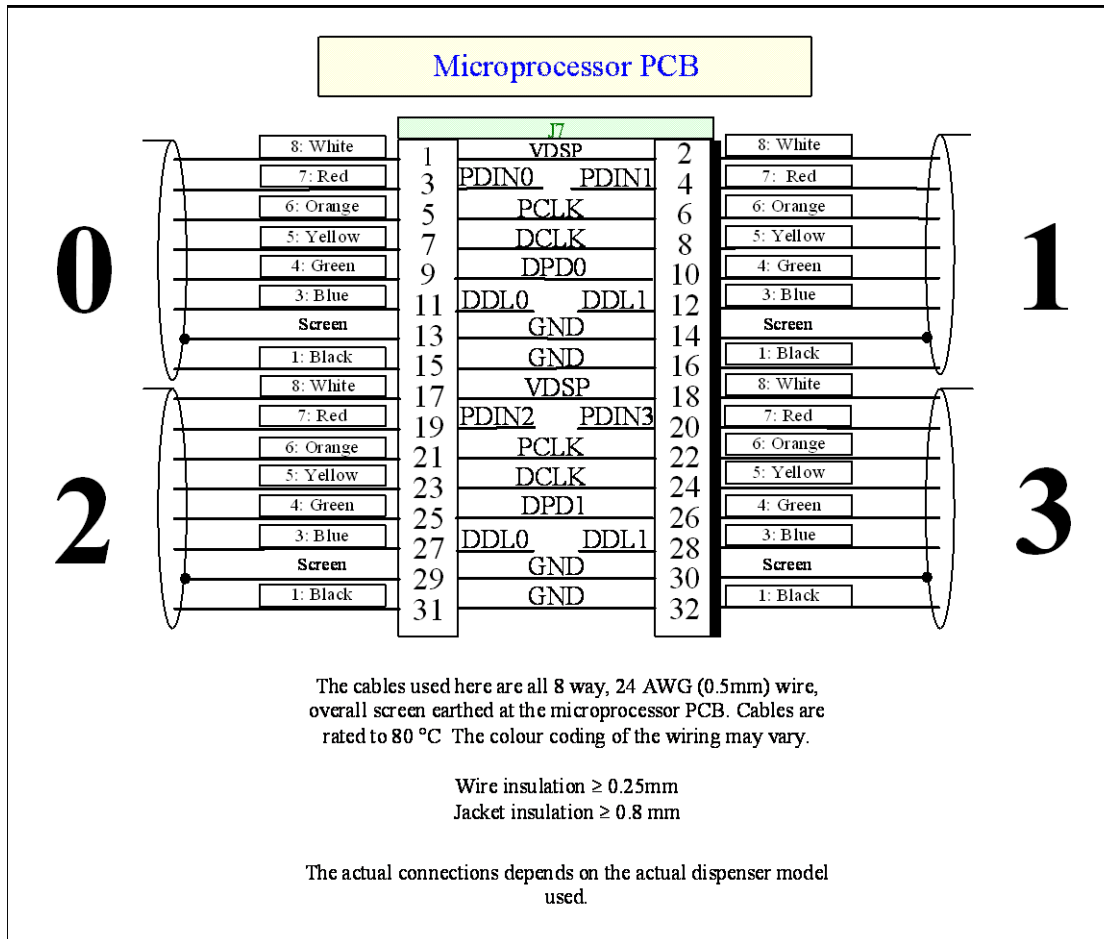

Figure 16. Microprocessor Display Connector (J7)

Figure 16 and Figure 17 show the two ends of the display/preset/multi-price display cables. The heavy line on one side of the plug indicates the side with the locking pins.
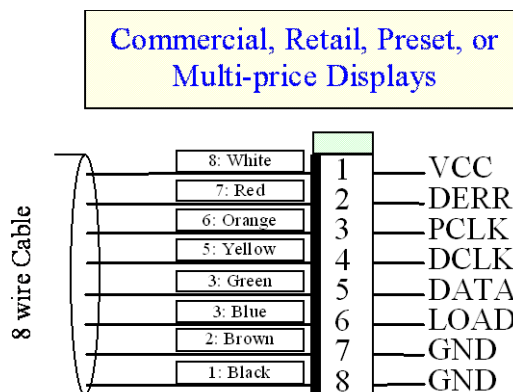

Figure 17. Display Connector

Figure 18 shows how the displays connect to the C4000 for various dispenser models. The four circuits (0-3) shown in Figure 18 are the same four circuits shown in Figure 16.
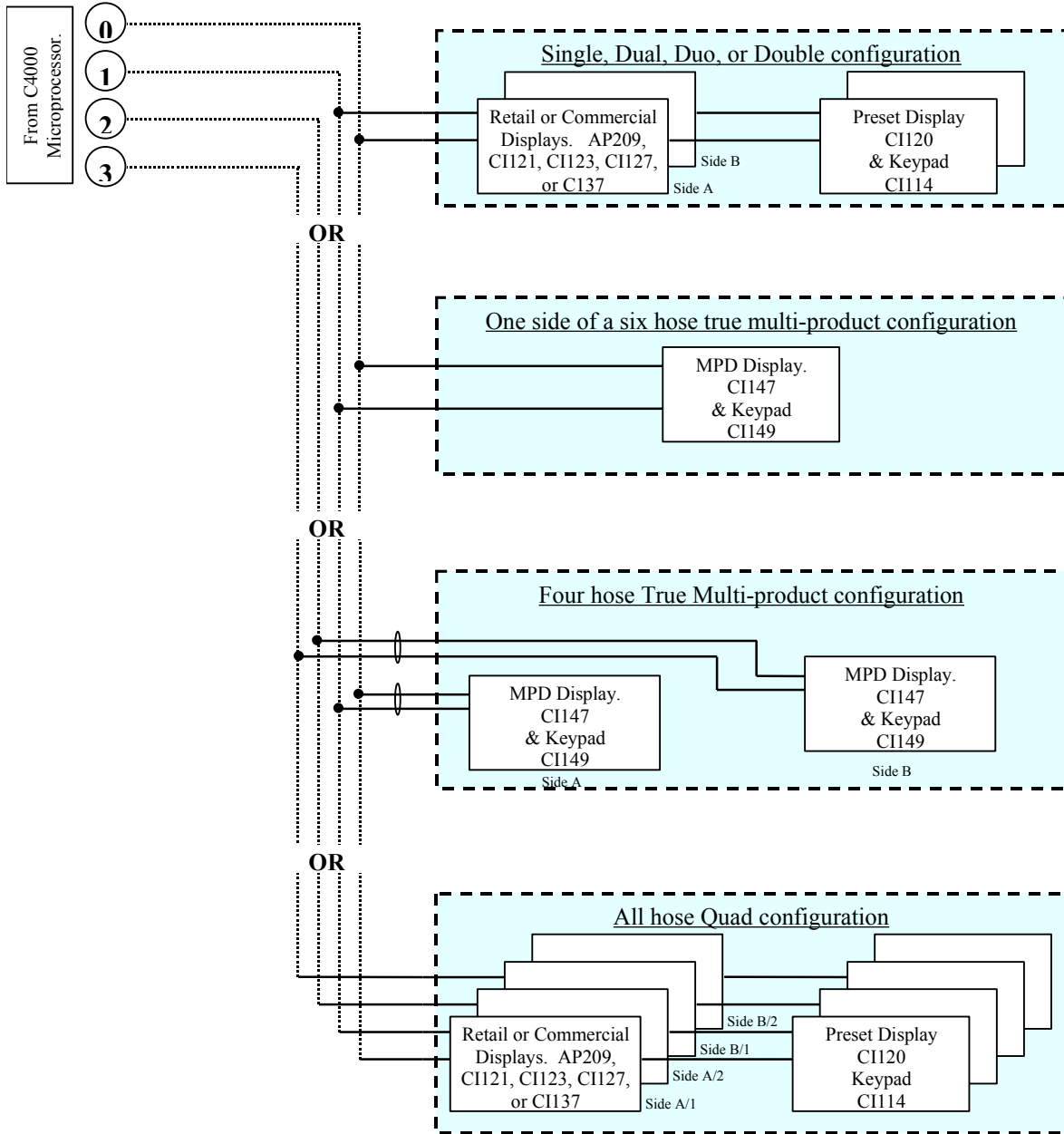
Figure 18. Display Connections for Various Dispenser Models.

Secure PIN Pad Unit

When connecting a BP Secure PIN pad to a C4000 a Distribution board CI-36 is required as an interface.

⚠ NOTE   *The Secure PIN pad / C4000 combination only works with old type Central Controllers*

Special software is required for the C4000. Secure PIN pads are not supported in either Futra or Communicator Controller software.
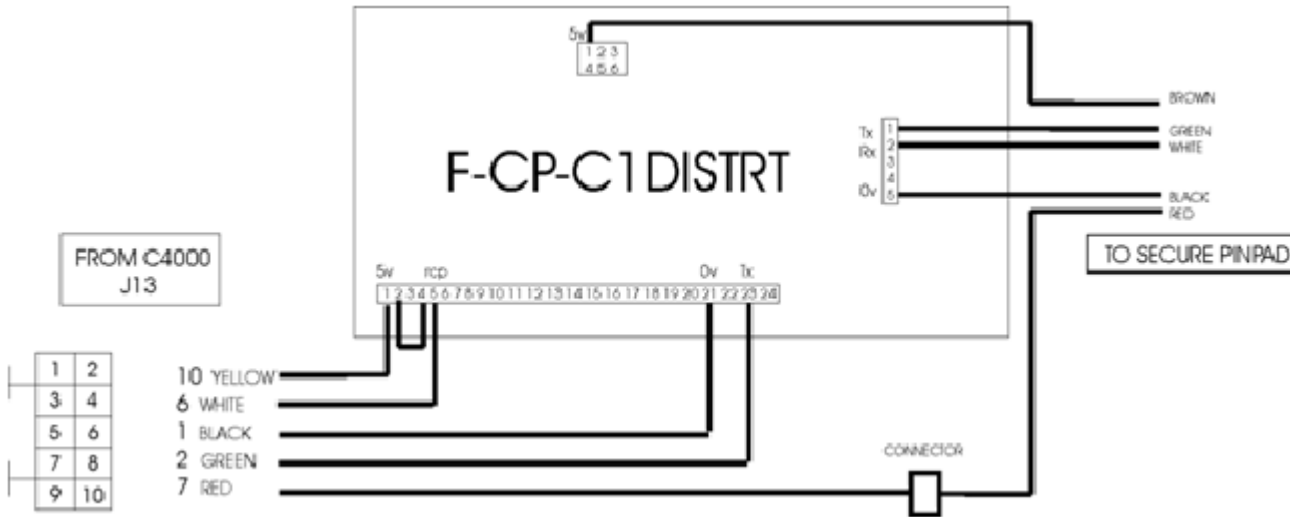

Figure 19. Secure PIN Pad

Modem

This device is not covered in this part of the manual. Refer to the FUTRA Service Supplement.

Encoder

The rotary encoder translates meter turns into electrical pulses. Each turn of the Bennett meter equals approximately 0.5 litre (eight turns = one US gallon). The encoder converts this to 150 pulses so that each pulse corresponds to approximately to 3ml.

Exact values are:

One rotation	=	0.47 litre
150 pulses	=	0.47 litre
One pulse	=	3.1 ml

When the C4000 'head' is used for other meters this ratio can vary, e.g. from 0.5 litres / turn to as high as 10 litres / turn.

The encoder will rotate up to 600 rpm before 'tripping' an 'Er 7' message. If the encoder is disconnected, the C4000 will not start the pump and an 'Er 9' message will be displayed.

The encoder connects to the C4000 via a six-core (only five cores used) data cable. The five cores used are:

Orange or White	-	5V terminal
Yellow or Black	-	0V terminal
Brown	-	B0 terminal
Blue	-	B1 terminal
Red	-	B2 terminal

Where B0, B1 & B2 are the three opto-senser connections

To reverse the rotation of the encoder sensing, the B0 & B2 wires should be reversed. The error message for reverse rotation is 'Er 8'.

Plug Name	Single	Single Suction, Dual, & true Dual	Quad	MHD's & MHP's
ENC 0 (J3)	Encoder from meter	Encoder from side 'A' meter	Encoder from side 'A', product 1	Encoder from product '1'
ENC 1 (J4)	Not used	Encoder from side 'B' meter	Encoder from side 'A', product 2	Encoder from product '2'
ENC 2 (J5)	Not used	Not used	Encoder from side 'B', product 1	Encoder from product '3'
ENC 3 (J6)	Not used	Not used	Encoder from side 'B', product 2	Not used

High/Low Flow Switch

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.

High/Low Flow Operation Methods

Method 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.

The switch has two positions: UP for high flow, and DOWN for low flow (80litres/m). The two termination screws are located at the top.

When the hi-lo 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.*

Method 2

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

Two solenoids valves 38mm NB & 18mm NB are installed in parallel after the meter. For high flow, both solenoids valves are open. For low flow, only the 18mm NB solenoid valve is open.

Method 3 - 3 Phase Pump (M200P)

This is used in pumping units without preset operation.

One 18mmNB-solenoid valve is piped as a 'by-pass' across the pumping unit. When open this allows some of the product being pumped to return to the inlet (low-pressure) side of the pump and hence reduces the flow rate through the nozzle.

Electrical Connections

To control the solenoids in high/low flow operation, the two core cable from the flow selector switch connects to 'FLOWx' or 'FLOWx' terminals on the C4000 Microprocessor PCB connector J12 (see Figure 10). 'FLOW0' is used for side 'A' and in the case of a dual with high/low flow on both sides, then side B's flow selector switch connects to the 'FLOW1' terminal. The switches are to be connected between the 'FLOWx' terminal and 'GND'.

Closing the contacts on the flow selector switch of Side 'A' ('FLOW0') causes the 'T7' output terminal to energise. For Side B the 'T9' output terminal is energised. In Method 1 the 38mmNB Solenoid is wired to the 'T7' output and the flow-selector switch is 'closed' in the high flow position. In Method 2 the 18mmNB Solenoid is wired to the 'T7' output and the flow-selector switch is 'closed' in the low flow position.

Totalisers

Electromechanical Totalisers

Only approved Compac totalisers are to be used. Some totalisers have a +ve and a -ve terminal.

Electronic Totals

As well as having electromechanical totalisers for litres dispensed from the pump, each C4000 stores in its memory a five-digit litres total of fuel dispensed from each hose. Both these totals are non-resettable.

These totals can be displayed by pressing the CANCEL or FILL buttons on the preset keypad, of the meter/hose in question, 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 down for at least three seconds and then tap it down five times in quick succession. The totals will appear as described above.

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 price-per-litre panel, when setting the pump number. The following table gives the reasons corresponding to each number.

Numerical Indicator	Readout	Explanation
1.00	"NOZ"	Nozzle hung up.
2.00	"PRESET"	Stopped at the preset. For CNG dispensers - completed a temperature compensated fill
3.00	"TIMEOUT"	No flow.
4.00	"REMSTOP"	Pump controller initiated stop.
5.00	"MAX"	Maximum litres and/or dollars reached.
6.00	"AIR" "GAS"	Air cut-out (Diesel air cut-out switch). Creepage due to vapour (LPG Dispenser).
7.00	"ERROR"	Encoder error, excess flow, etc.
8.00	"SEQUENCE"	CNG applications only.
9.00	"SUMP"	Switch activated by leaking product.
10.00	"BULK SAFETY"	
11.00	"NEW CWID"	
12.00	"DPE MAIN"	Parity error on main display
13.00	"DPE MP"	Parity error on multi price display
14.00	"DA MAIN"	Parity error on main display
15.00	"DA MP1"	Parity error on multi price display 1
16.00	"DA MP2"	Parity error on multi price display 2
17.00	"DA MP3"	Parity error on multi price display 3
18.00	"DA MP4"	Parity error on multi price display 4
19.00	"LPG CREEP"	
20.00	"TC1"	CNG Temperature compensated fill stage 1
21.00	"TC2"	CNG Temperature compensated fill stage 2
22.00	"TC3"	CNG Temperature compensated fill stage 3

Software Upgrade Procedure

This is the software upgrade procedure to be followed for all bulk meter registers and all pumps with a C4000 other than those with FUTRA software.

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

2. 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. Data set-up to include:

3. K factor 'F '

4. No flow delay 'n'

5. Pre-set cut-off margin 'PCut'

6. Density Factor 'dSF' (CNG only)

    ▪ Specific density 'SPG' (LPG only) Flow rate 'FLO' 'r' (some bulkmeters only)

    ▪ Temperature 'E' (bulk meter or LPG only)

    ▪ L Cut 'L' or 'LCUT' (bulkmeter only)

    ▪ H Cut 'H' or 'HCUT' (bulkmeter only)

    ▪ F Cut 'F' or 'FCUT' (bulkmeteronly)

    ▪ Set resolution 'Sr'

    ▪ Configuration 'C '

    ▪ 'b' Settings

    ▪ Price 'Pr' or 'P'

    ▪ Density 'd' (bulkmeters only)

    ▪ Pump number 'Pn'

    ▪ Sequencing Rate 'SE9' (CNG only)

    ▪ Access code 'A' (comcard or CWIDKey Basic dispensers only)

7. Electronic and mechanical totals should also be recorded.

8. In the case of 'Comcard Basic', 'Compin' (Mining), or 'CWIDKey Basic' systems, a printout of card/pin/key totals must be obtained before changing software. This printout will also give card/pin/key validation status. If no printer is available, use Scrolling Tote option (refer Totalisers (see page 56)).

9. The above steps are taken to safeguard against software incompatibility causing loss of information.

10. Turn off power.

11. Remove software EPROM (removable chip labelled C4000 PXX or XX-X-XX:XX.X) using an EPROM extractor. (See Figure 1 for the location of the EPROM.)

12. 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 (see diagram below).

13. Turn on power.

14. Check that the data recorded in Steps 2 and 4 is still present, if not re-enter.

15. Check the electronic totals, if not as before then give 'before' and 'after' totals to relevant people on site.

16. Ensure that the status of cards/pins/keys, on 'Comcard', 'Compin', or CWIDKey systems, are 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.

17. Test pump operation.

⚠ CAUTION *When replacing Integrated Circuit chips (refer to Figure 19 below), 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.
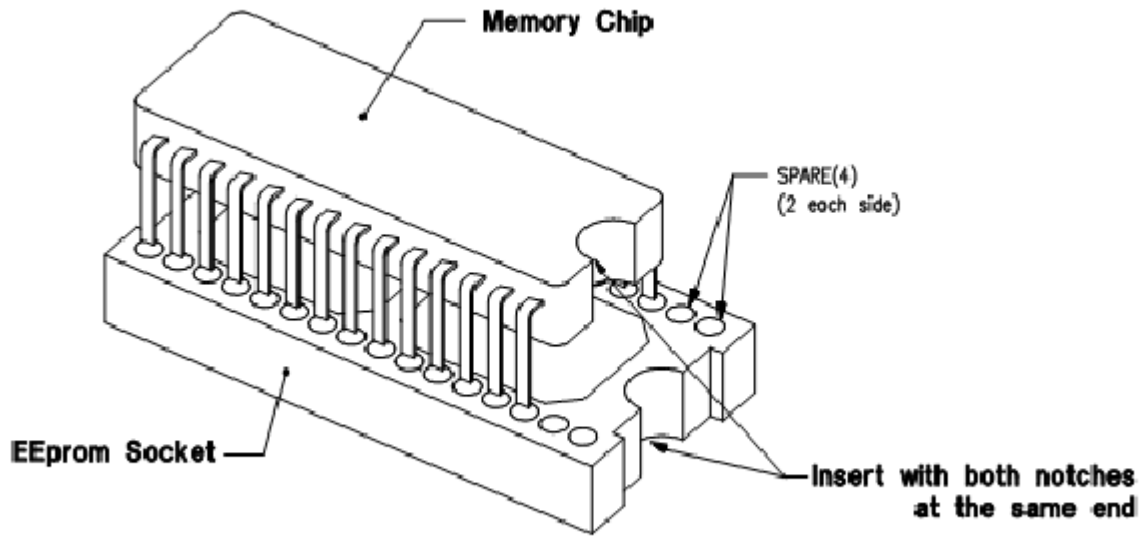

Figure 3: Memory chip installation

Figure 20. Software IC Insertion

Solid State Relays (Triacs)

General

The solid state relay, as the name implies, is a solid state switch, controlled by the C4000. These solid-state switches control the C4000 220-240volt outputs.
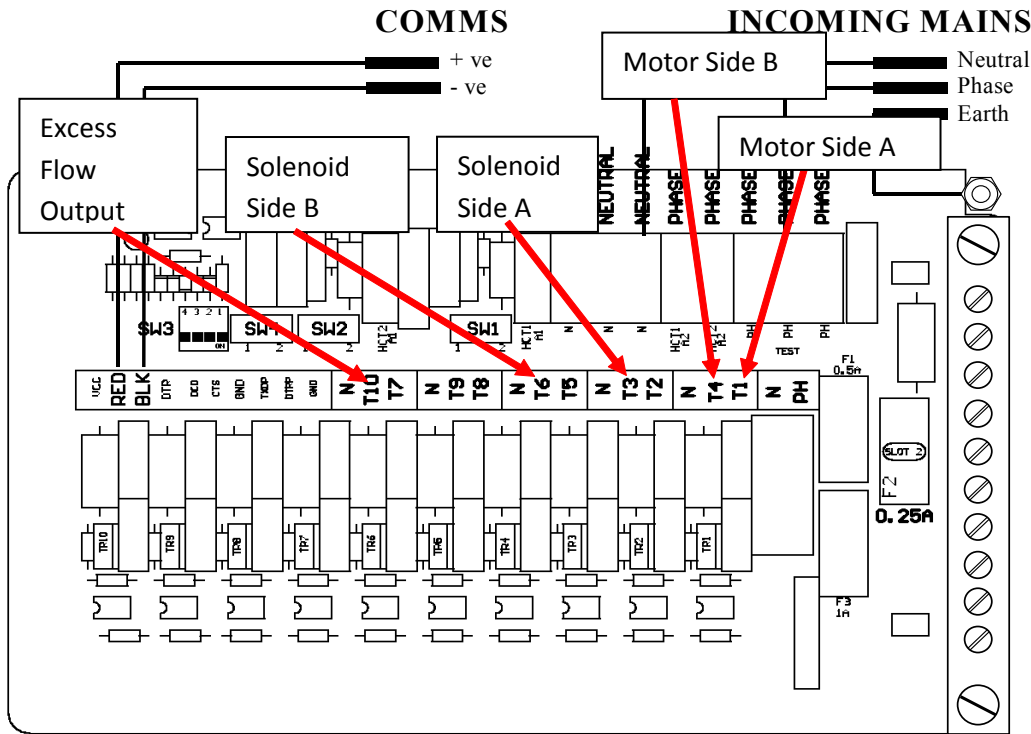

Figure 7. Location of Solid State Relays (Triacs) and Comms DIP Switches (SW3)

There are 10 separate solid state relays (small triacs) on the C4000 PCB. The output terminals for these triacs is T1 to T10. Their function varies depending on what the C4000 'head' is controlling. Below are tables showing the use of these outputs for various applications.

The T1 and the T4 outputs can be used to drive a high current triac whose output will be on the LOAD1 and LOAD2 terminals respectively. Each of these outputs (T1 and T4) has an associated switch (SW1 and SW2 respectively) which must be used to select the type of output required (refer Figure 8).

The T7 output cannot drive a high current triac directly but may be looped to T1 or T4 of another C4000. If it is looped then SW4 must be in the mid position. Position 1 of SW4 should never need to be used.

The power for the triac outputs can be supplied from a separate mains supply (Separate from the supply for the microprocessor). There are two blocks of connectors for the phase connection (refer Figure 7). The block of six connectors supplies the microprocessor and the block of four connectors supplies the triac outputs. These two blocks of connectors are normally looped together in the factory.

Triacs C4000 Single, Dual & Quad

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

Triacs C4000 MPD6 & MPP6 side A

Power Terminal	Symbol	Function		High / Low Current Output
		MPD6 / MPP6 side 'A'	MPD6 / MPP6 side 'B'	
T1 or LOAD1	MTR1 / MTR3	Motor 1 relay control (SW1 = 2) or Internal pump motor 1 (SW1 = 1)	Motor 3 relay control (SW1 = Mid)or Internal pump motor 3 (SW1 = 1)	Low 300mA max □or□ High (40 A max)
T2	SFS1	Secondary Flow Coil Solenoid 1	Secondary Flow Coil Solenoid 1	Low (300 mA max)
T3	PFS1	Primary Flow Coil Solenoid 1	Primary Flow Coil Solenoid 1	Low (300 mA max)
T4 or LOAD2	MTR2	Motor 2 relay control (SW2 = 2) or Internal pump motor 2 (SW2 = 1)	Motor 2 relay control (SW2 = Mid) or Internal pump motor 2 (SW2 = Mid)	Low 300mA max □or□ High (40 A max)
T5	SFS2	Secondary Flow Coil Solenoid 2	Secondary Flow Coil Solenoid 2	Low (300 mA max)
T6	PFS2	Primary Flow Coil Solenoid 2	Primary Flow Coil Solenoid 2	Low (300 mA max)
T7	MTR3 / MTR1	Motor 3 relay control (SW4 = 2) or Internal pump motor 3 (SW = Mid)	Motor 1 relay control (SW4 = Mid) or Internal pump motor 1 (SW4 = Mid)	Low 300mA max □or□ High (40 A max)
T8	SFS3	Secondary Flow Coil Solenoid 3	Secondary Flow Coil Solenoid 3	Low (300 mA max)
T9	PFS3	Primary Flow Coil Solenoid 3	Primary Flow Coil Solenoid 3	Low (300 mA max)
T10		Spare	Spare	Low (300 mA max)

⚠ NOTE   For a six hose MPD / MPP: T1 of side 'A' loops to T7 of side 'B', T4 of side 'A' loops to T4 of side 'B', and T7 of side 'A' loops to T1 of side 'B'.

Triacs C4000 LPG Single/Dual, CNG & Bulk Meter

Power Terminal	Function			High / Low
	LPG Single/Dual	**CNG**	**Bulk Meter**	**Current output**
T1	Electric Motor Control (SW1 = 2) side 'A'	Low A (SW1 = 2)	Electric Motor Control (SW1 = 2)	Low (300 mA max)
T2	Secondary Coil Solenoid Control Side 'A'	Spare	Low Flow. New Compac OCV Control N/C Solenoid	Low (300 mA max)
T3	Primary Coil Solenoid Control Side 'A'	Med 1A	High Flow. New Compac OCV Control N/C Solenoid	Low (300 mA max)
T4	Electric Motor Control (SW2 = mid) Side 'B', looped to T1	High A (SW2 = 2)	Tank Valve Signal (SW2 = 2)	Low (300 mA max)
T5	Secondary Coil Solenoid Control Side 'B'	Spare	Spare	Low (300 mA max)
T6	Primary Coil Solenoid Control Side 'B'	Low B	Caltex	Low (300 mA max)
T7	Spare	Med 1B (SW4 = 2)	Mobil (SW4 = 2)	Low (300 mA max)
T8	Spare	Spare	Shell	Low (300 mA max)
T9	Spare	High B	BP	Low (300 mA max)
T10	Excess flow output - Turned on if flow rate exceeds 100litres/min. Stays on until dispenser turned off.	Auxiliary Output for CNG Compressor Control	Additive Pulse	Low (300 mA max)

High Current Triac Option

Where high current (40A) outputs are required (i.e. driving the pump motor directly) high current triacs are fitted to the power supply PCB. If a high current triac is installed for T1 and/or T4 then its respective snubber switch (SW1 & SW2 respectively) needs to be switched to position 1 (Refer Figure 8).
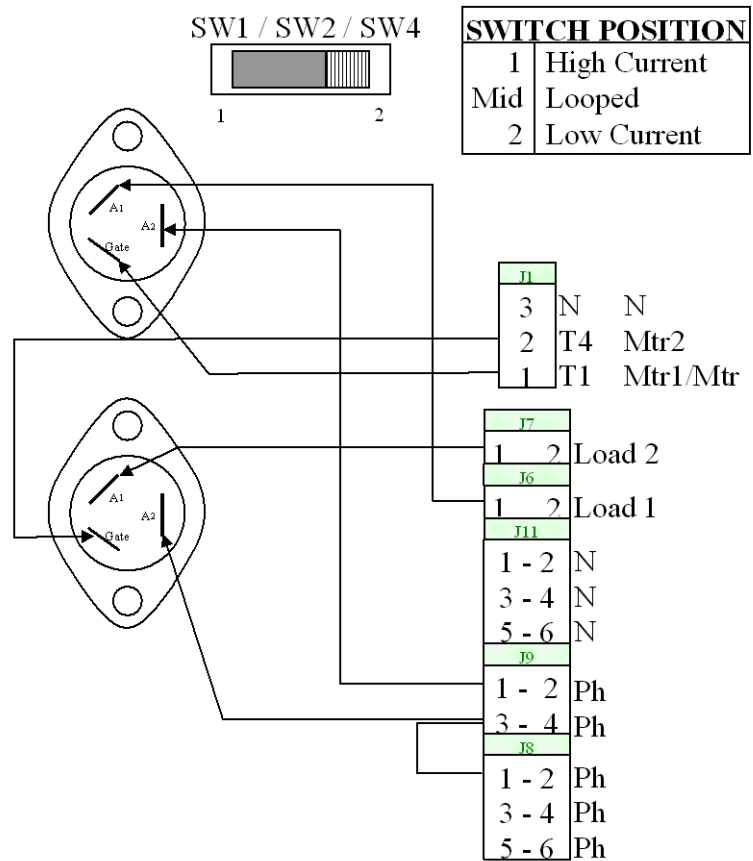

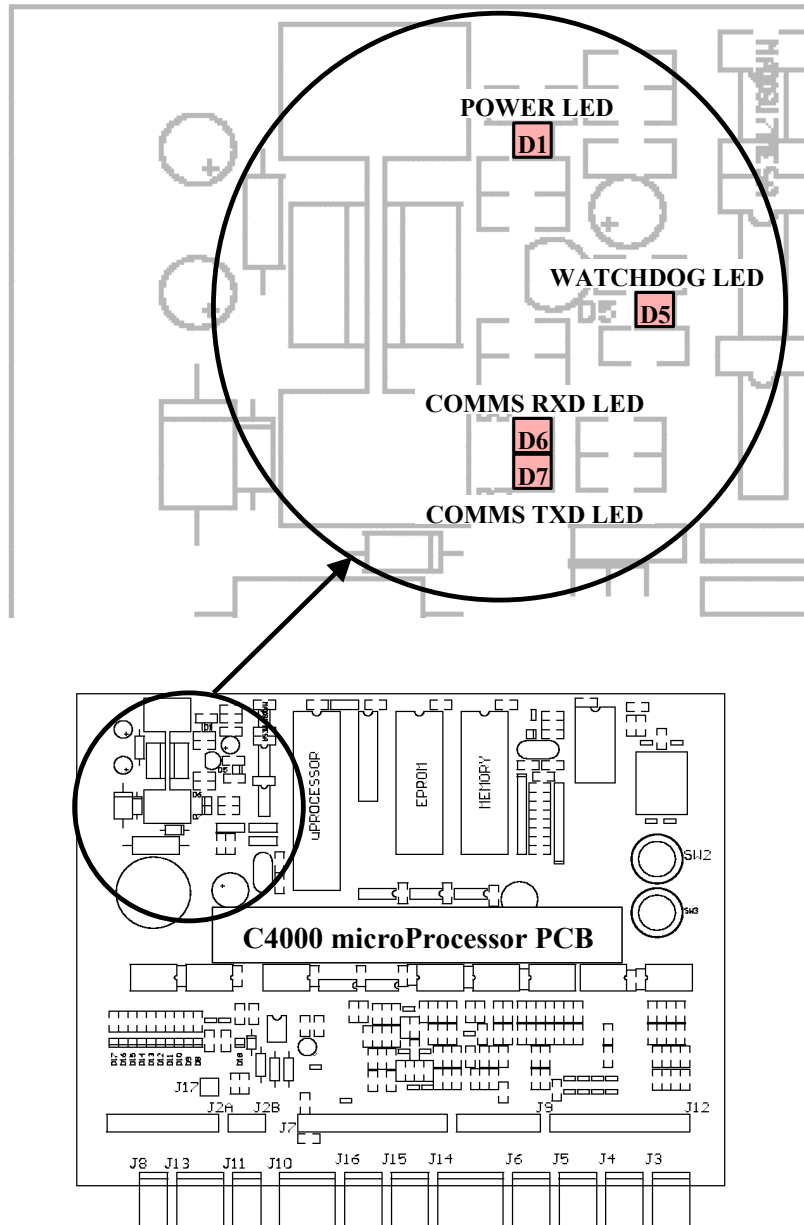Figure 8 High Current Triac Option

Indicator LEDs

Figure 5. Location of Power, Watchdog, RXD & TXD LEDs

Power LED

The Power LED (refer Figure 5) 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 (refer Figure 5) 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 (refer Figure 5) 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).
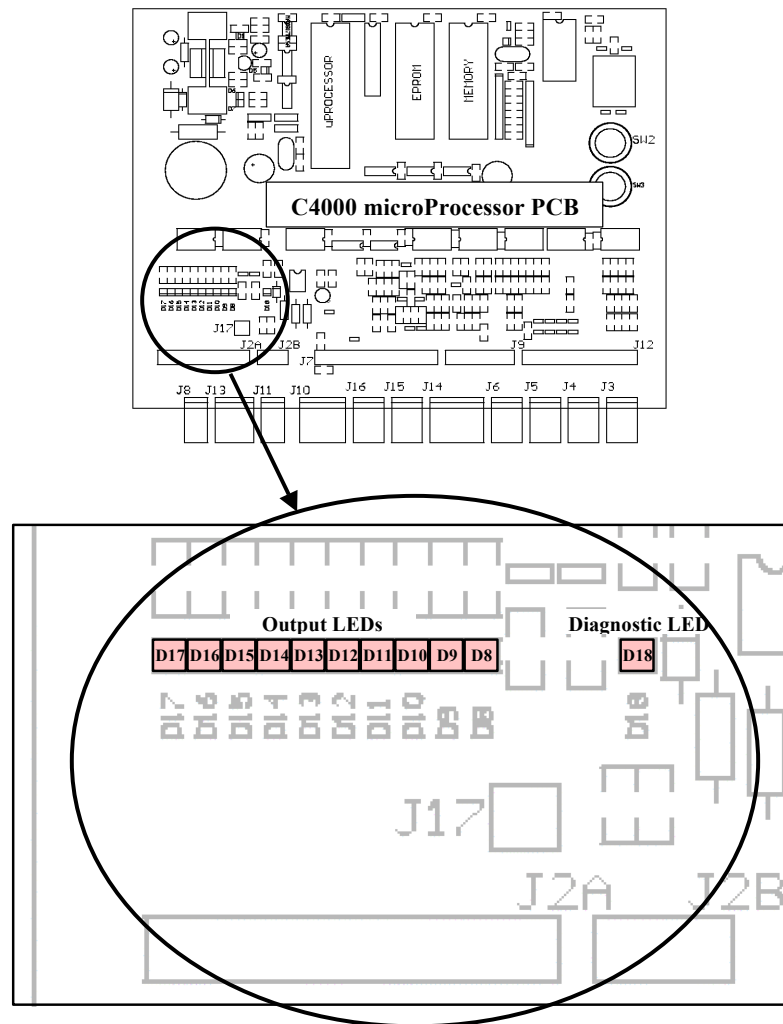
Figure 6. Location of Output & Diagnostic LEDs

Output LEDs

The ten Output LEDs (refer Figure 6) indicate which triac outputs are being switched on. D8-D17 corresponds to the output triacs T1-T10 (refer Figure 7).

Diagnostic LED

The Diagnostic LED Figure 6) 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.

Fault Finding

Symptom	Action
Watchdog LED is on (refer to Figure 5 for the location of the Watchdog LED)	Is the processor LED (DL1) flashing? Yes - Turn power off Check for any foreign bodies i.e. wire off-cuts etc, on processor PCB. Check all IC's are firmly in their sockets. Re-power the C4000 If watchdog resets (i.e. stays off), then everything is okay. Replace C4000 PCB if watchdog still comes on after re-power. No - Replace C4000 PCB. Are IC's plugged in correctly? Are IC chips the same? Is LK1 made? Are intrinsic plugs plugged in correctly?
Diagnostic LED not flashing (refer to Figure 6 for the location of the Diagnostic LED)	Is Power LED on? Yes - Replace C4000 PCB No - Refer below
Power LED off (refer to Figure 5 for the location of the Power LED)	Is the power to the C4000 on? Yes - Check Fuse F1 Check for a short on intrinsic devices. Unplug and re-plug each device, checking the power LED status each time. If the LED still off, turn power supply off for a few minutes then back on & try again. Replace C4000 PCB if fault not found No - Turn on power supply & try again.
Motor won't start	Is Solid State Relay LED on? Yes - Check Triac Fuse F2 Check all Motor connections Check Motor Check wiring Select a spare High Current Solid State Relay if the above checks are ok. No - Check Nozzle Switch wiring & operation.

	Replace C4000 PCB if fault not found
Motor running all the time	Is Solid State Relay LED on?
	Yes - Check Nozzle Switch is releasing
	No - Select a spare High Current Solid State Relay.
	Replace C4000 PCB if fault not found
Solenoid not energising	Is Solid State Relay LED on?
	Yes - Check Triac Fuse F2
	Check all Solenoid connections
	Check Solenoid
	Select a spare Low Current Solid State Relay if the above checks are okay.
	No - Check Nozzle Switch operation.
	Replace C4000 PCB if fault not found
Preset Display Digit flashing	Is the respective Preset Button stuck in?
	Yes - Remove grit if any and check spacing of keypad to fascia gives good key operation.
	Check wiring & condition of display plugs.
	No - Replace keypad. If problem still exists, replace preset PCB.
Secure PIN Pad - Display Off	Is PIN pad backlighting on?
	Yes - Check 5V and TX wires for continuity.
	NO - Check the 0V wire for continuity and that the plug is secure.
	Replace Secure PIN pad if fault is not found.
Secure PIN Pad not accepting numbers	Is PIN pad display on?
	Yes - Check RX wire for continuity
	No - Check cable and plug.
	If no fault found, replace the Secure PIN pad.
Star Printer not working	Is power on?
	Yes - Check connection of comms cable
	Check dip switch settings (refer Printer Set-up (see page 40))
	Carry out self test (refer Printer Set-up (see page 40))
	No - Check cable and plug.
	If no fault found, contact Compac Help Desk.

Error Codes

Error Code	Fault	Action
Err 3	No price set.	Set a price at the pump or at the controller.
Err 4	CWID offline.	Check connections. Change CWID PCB.
Err 7	Excess flow.	Check for air.
Err 8	Excess reverse rotation of encoder.	Check product is not flowing back into the tank once the delivery has finished.
Err 9	Faulty encoder or disconnected encoder.	Check encoder circuit.
Err 10	Configuration Lost	Reconfigure C4000
Err 11	Invalid access code (Comcard or CWIDKey Basic systems only).	Enter valid access code.
Err 12	C4000 memory failure.	Change memory E2prom 'chip'.
Err 13	Temperature/Pressure Interface unplugged.	Reconnect interface board or replace.
Err 14	Temperature Probe disconnected.	Reconnect temperature probe or replace.
Err 15	Pressure Probe disconnected (LPG only).	Reconnect pressure probe or replace.

⚠ NOTE

*For Error 7 (LPG) also occurs if flow rate exceeds 100 litres/min.*

For Error 8 excess reverse rotation means the encoder has turned backwards more than 3/4 of one turn during a delivery, or within two seconds of the end of a delivery. This only occurs if the non-return valves installed on site are faulty.

Error Messages

On Pump LCD Display	On PIN Pad Dot Matrix Display (if Connected)	Explanation
REPAS	Pass Again	Card not read properly, try re-swiping. In addition, C4000 may be configured for the wrong card reader track, or the card or card reader could be faulty.
HOLD	System not ready	Pump no longer communicating with Central Controller.
:0.0		The full-colon on the display indicates that the processor supply has been OFF and back ON since the last transaction.
_ _ _ _ _	Restricted Fuel	Card not validated for the pump/dispenser fuel grade set.
_ _ _ _ _	Wrong System	Incorrect card used or the controller has the incorrect access code or ISO number set. Or requires setting for a particular Card Type.
_ _ _ _ _	Expired Card	Card expiry date is earlier than controller date
_ _ _ _ _	Bad Card	Algorithm check sum on cards is invalid
_ _ _ _ _	Wrong Pin	An incorrect or invalid pin has been entered.
_ _ _ _ _	Wrong Network	The network encoded on the card is invalidated in the controller.
RAnGE		Temperature probe out of range. (Only displayed when temperature setting selected on K Factor Switch). Probe either faulty or not connected.
	Low Battery	Fault on Secure PIN pad Processor PCB- replace complete PIN pad.
	Memory Error	Fault on Secure PIN pad processor PCB replace complete PIN pad.
AIr (Flashing)		The air cut-out switch has operated.
GAS (flashing)		LPG ONLY. Flow rate fell to between 0 and 6 litres/min for more than 6 seconds. Indicates creepage due to presence of vapour.

Appendix A

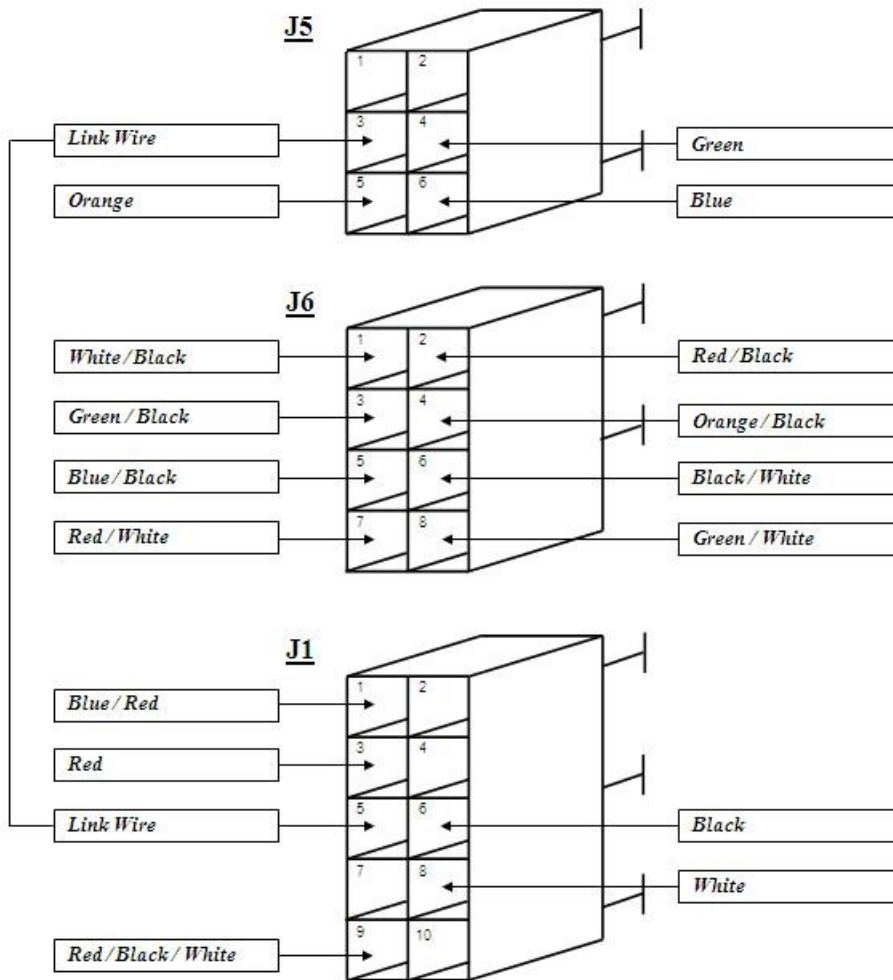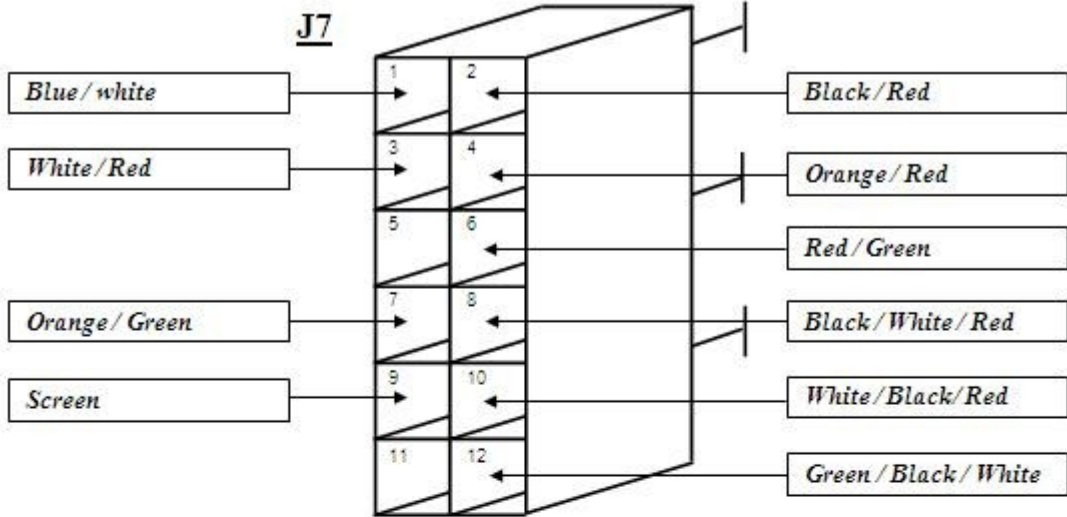## C4000 with RS232 Wiring
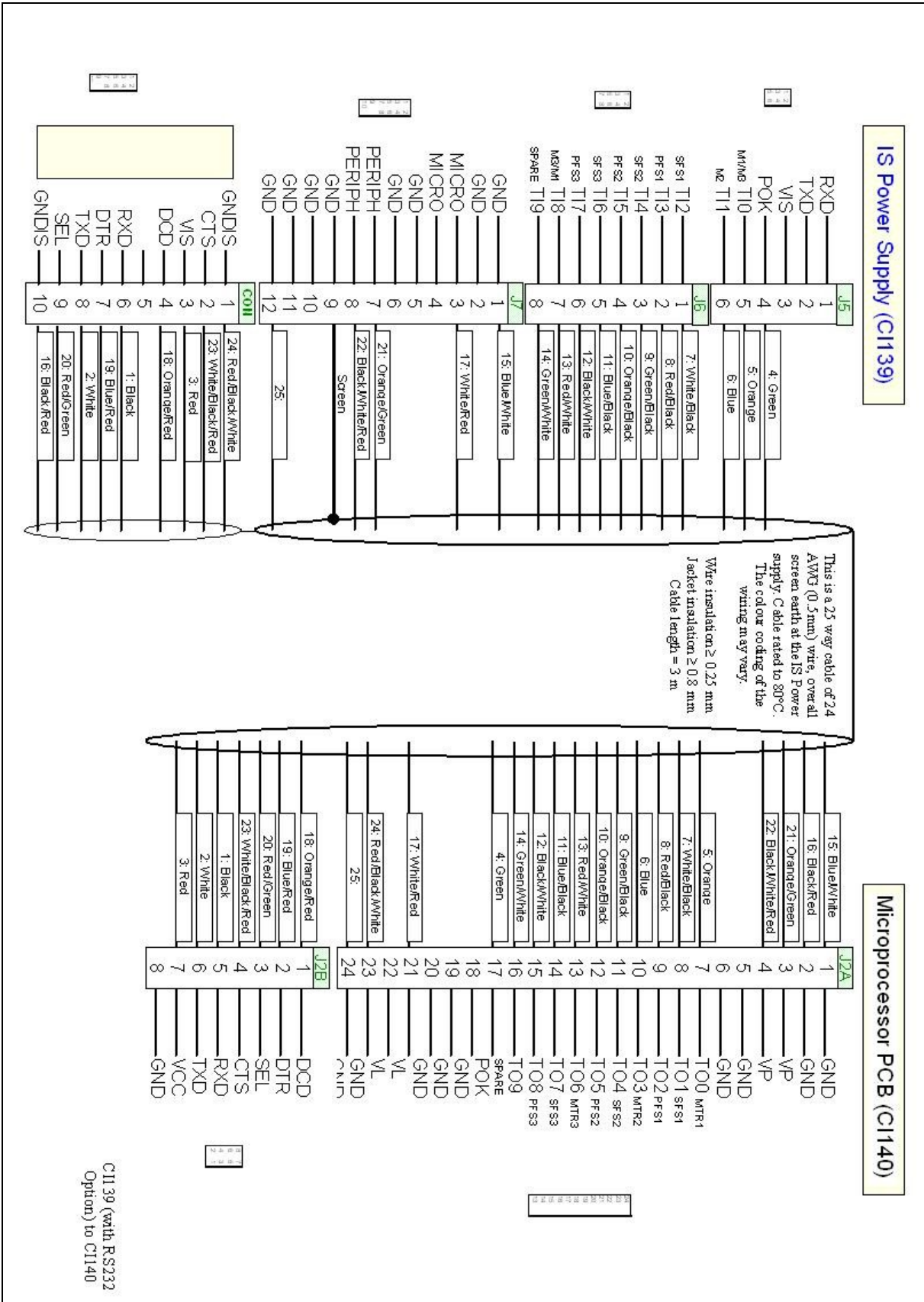
RS485 Forecourt Wiring

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

C4000 Power Supply

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

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

C4000 IS Cable for RS485 Forecourt

<u>**J7**</u>

Blue / white →	1	2 ← Black / Red
White / Red →	3	4 ← Orange / Red
	5	6 ← Red / Green
Orange / Green →	7	8 ← Black / White / Red
Screen →	9	10 ← White / Black / Red
	11	12 ← Green / Black / White

<u>MICROPROCESSOR END</u>

<u>**J13**</u>

	1	2
	3	4
Red / Green →	5	6
	7	8
White / Black / Red →	9	10

J2A

Left	Pin	Pin	Right
Green / Black / white	24	23	
Orange / Red	22	21	White / Red
	20	19	
Blue / Red	18	17	Green
Green / White	16	15	Black / White
Blue / Black	14	13	Red / White
Orange / Black	12	11	Green / Black
Blue	10	9	Red / Black
White / Black	8	7	Orange
	6	5	
Black / White / Red	4	3	Orange / Green
Black / Red	2	1	Blue / White

J2B

Left	Pin	Pin	Right
	8	7	Red
White	6	5	Black
	4	3	Red / Black / White
	2	1	

C4000 with RS485 Forecourt Wiring

Gilbarco Interface Wiring

Glossary of Terms

TERM	DESCRIPTION
ATG	Automatic Tank Gauging
Class 1 Zone 0	An area in which an explosive-gas atmosphere is present continuously or is present for long periods.
Class 1 Zone 1	An area in which an explosive-gas atmosphere is likely to occur in normal operation.
Class 1 Zone 2	An area in which an explosive-gas atmosphere is not likely to occur in normal operation, and if it does occur it will exist for short periods only.
ComFutra	A model of pump mounted authorisation terminal made by Compac.
CPU	Central Processing Unit.
CWID	Compac Wireless Identifier.
DCA	Driveway Card Acceptor - A type of pump authorisation terminal made by Compac.
Encoder	A device that translates rotary motion into electronic pulses. Often referred to as a pulser.
Head	Dispenser calculator/Indicator. C4000 PCB, complete with power supply.
HID	Transponder key authorisation system
Intrinsically safe circuit	A circuit in which any spark or any thermal effect produced in the test conditions prescribed in the relevant standard (which includes normal operation and specified fault conditions) is incapable of causing ignition of a given explosive atmosphere.
Intrinsically safe electrical equipment	Electrical equipment in which all the circuits are intrinsically safe. The equipment may be self-contained or may form part of an intrinsically safe electrical system.
Intrinsically safe electrical system	An assembly of interconnected items of electrical equipment in which the circuits or parts of circuits, intended to be used in an explosive atmosphere, are intrinsically safe circuits.
LED	Light emitting diode.
Memory chip	EPROM chip that stores parameters and/or transaction & totals.
OPT	Outdoor Payment Terminal - A type of authorisation terminal designed for credit card applications made by Compac.
PCB	Printed Circuit Board.
RAS	Retail Authorisation Station - Authorisation terminal designed for manned sites
Via	'Plated through hole' in a PCB that enables tracks to swap sides on a PCB.
Software chip	EPROM chip with label indicating program version.