COMPAC

MADE TO MEASURE

C4000 MASTER MANUAL

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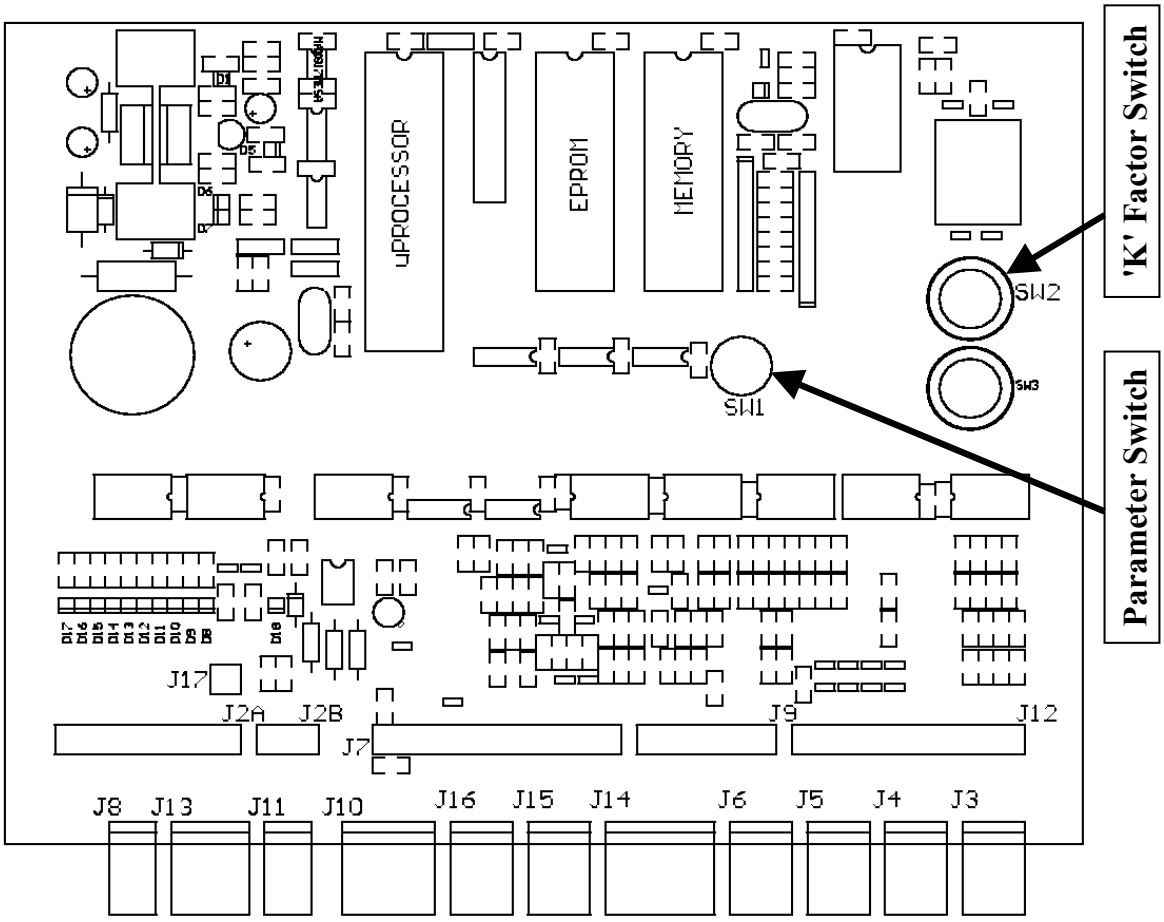
1. DESCRIPTION

1.1. General

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 PINPad
J2: To I.S. Power	**J8:** Temperature Comp.	
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

The C4000 microprocessor, commonly referred to as the 'head', is powered by an intrinsically safe power supply, and is designed to operate in a class 1 zone 1 area. The power supply and the 220-240V output circuitry is housed in a flameproof box.

The C4000 ('head') performs the following functions (depending upon which accessories are connected):

- Converts the rotation of a meter into pulses via the Compac Encoder.

- Converts these input pulses into litres.
- Controls the operation of an electric motor or a submersible pump.
- Controls the Preset Valves.
- Provides Temperature Compensation to the litres value.
- Provides an electronic 'K-Factor' for calibration. This means that the unit can be used on any type of meter, regardless of turns per litre.
- Can be fitted with a card-reader directly on the dispenser/pump to give unattended 'fleet' type access.
- Can be fitted with a PIN / Odometer pad, with or without card reader, on the dispenser/pump.
- Can be plugged into the Compac Modem Package (Futra only).
- Has a real time clock for memory and card-reader reporting functions (Futra only).
- The Display options available are (no. of digits in parenthesis):
  - 6 digit Commercial Display (Litres only) *****
  - Standard Retail Display (Price, Litres and $/L) (5 x 5 x 4)
  - 6 digit Retail Display (Price, Litres, and $/L) (6 x 6 x 4) *****
  - Bulkmeter Display (Litres, Preset, and Rate of Flow) (6x6x4)
  - MPD Display (Price, Litres, and up to three $/L) (5 x 5 x 4)
  - Preset (Litres or Dollars) (5)
  - Last Sale, kilograms, dollars and price (CNG only)

*** Set Display resolution to Hiflow when using 6 digit displays. (refer section 3.1.4)**

- Can report by any of the following options:
  - Card/Pin/Key Totals printout (Comcard, Compin, & CWIDKey only)
  - Card/Pin/Key Transaction Audit Trail printout - Small Docket Printer (Comcard, Compin, & CWIDKey only)
  - Receipt Printout - Small Docket Printer (Central Controller & Futra systems)
  - Audit Trail/Report Printout of transactions - 11" Report Printer (Central Controller & Futra only)

1.2. Safety Precautions

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.

1.3. 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 circuit boards returned, if proper anti-static precautions have not been taken.

2. MAIN FEATURES

2.1. 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

2.2. Configurations

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

2.2.1. Single Commercial Fuel Dispenser

Standard Options:

- Litres only display, two - one per side
- Motor circuit, one only
- One Encoder
- One Nozzle Switch
- C4000 Head

Extras:

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

* Also see 'FUTRA' configuration.

2.2.2. 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:

- Temperature Compensation
- Preset

2.2.3. 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:

- Temperature Compensation
- Preset

2.2.4. 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

Extras:

- Card-reader
- Temperature Compensation
- PIN-Pad
- Receipt Printer

* Also see 'FUTRA' configuration

2.2.5. Single Suction Dual Retail (Duo)

Standard Options:

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

Extras:

- Temperature Compensation

2.2.6. Dual Retail (Dual or Double)

Standard Options:

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

Extras:

- Temperature Compensation

2.2.7. Multi Product (4 hose) Retail

Standard Options:

- 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

Extras:

- Card-reader
- PIN Pad
- Receipt Printer

2.2.8. Multi Product (4 hose) Retail, Type 'A' all hoses in use

Standard Options:

- 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

Extras:

- Temperature Compensation

2.2.9. 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

2.2.10. Multi Product (6 hose) Retail, Type 'A' all hoses in use

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:

- Temperature Compensation

2.2.11. Futra (Uses 'Futra' Software)

This type of system 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:

- CardReader
- Retail Displays
- Preset
- Modem
- Temperature Compensation
- High/Low Flow Operation
- Tank Gauging, for one tank only
- Receipt Printer

3. SET-UP MODES

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

1. Configuration (K Factor) Switch Settings
   - This switch accesses different options that must be set appropriately for the particular type of dispenser.
2. Parameter Switch Settings
   - 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 (access code - refer section 3.3.8).
   - With CNG dispensers, the sequencing rate between 'banks' is also set using the parameter switch (reference section 3.3.6).

The positions of the above switches are shown on Figure 1, page 1. Set up of the C4000 must be done in the following sequence:

1. '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 section 3.1.8.
Display Resolution	'Sr'	'Sr X.XX'	Refer section 3.1.4.
Temperature	'E'	'E XXX.X'	Refer section 3.2.3. LPG and Bulk-metering only
ACV Flowrate	'FLO'	'r XXXX'	Refer section 3.2.4. Bulk-metering only
Density Calibration	'LPG'	'00000'	Refer section **Error! Reference source not found.**. LPG only.
No-flow cut-off	'n'	'n XXX'	Refer section 3.1.3
Solenoid delay	'Sd'	'd XXX'	Refer section 3.1.5
Preset Cut-Off	'PCut'	'PC X.XX'	Refer section 3.1.6
'b' settings	'b'	'b XXXX'	Refer section 3.1.7
'K' Factor	'F', 'Fb', 'F 1', 'F2', or 'F3'	'X.XXXX'	Refer section 3.1.2
H-Cut	'HCut'	'HXXXX'	Refer section 3.2.6. Bulk-metering only
L-Cut	'LCut'	'LXXXX'	Refer section 3.2.5. Bulk-metering only
F-Cut	'FCut'	'FXXXX'	Refer section 3.2.7. Bulk-metering only
Density Factor	'dSF'	'X.XXXX'	Refer section 3.2.1. CNG only

SP: Set decimal place. Appears only when the unit is set-up for CNG.

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).

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

3.1. 'K' Factor Switch

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

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

NOTE: The C4000 will reset at any stage during the 'K' Factor switch operation if the switch is not pressed for a period exceeding 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.

3.1.1. 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.	

IMPORTANT NOTE:

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

3.1.2. Calibration ('K') Factor

(See also section 0 for more information on the encoder/pulser)

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

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

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.

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

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

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

Change the existing 'K' Factor to this new value.

Setting the 'K' Factor

Refer to section 3.1.1 page 8. The displays will indicate as below

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

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 (see section 3.2.5).

Caution: Be careful when calibrating dual or multi-hose pumps & dispensers to ensure that the correct 'K' factor is being changed.

3.1.3. 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 after the 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 section 3.1.1 page 8. While setting this value the price display will indicate ***'n'*** and the volume display will indicate ***'nXXXX'.***

3.1.4. 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	

NOTES:

1. 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 ':00 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

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.

3.1.5. 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 section 3.1.1 page 8. While setting this value, the price display will indicate **'Sd'** and the volume display will indicate **'dXXXX'**

3.1.6. Pre-Set Cut-Off

Prior to the dispenser reaching its preset amount, the solenoids are switched to give a low flowrate. 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 flowrate.

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 Cutoff 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 cutoff to be entered is 0.33.

Setting the Pre-Set Cut-Off

Refer to section 3.1.1 page 8. The Price display shows **'PCUt'** and the volume display shows **'PCX.XX'**. The range is from 0.01 to 9.99 litres.

3.1.7. 'b' Settings.

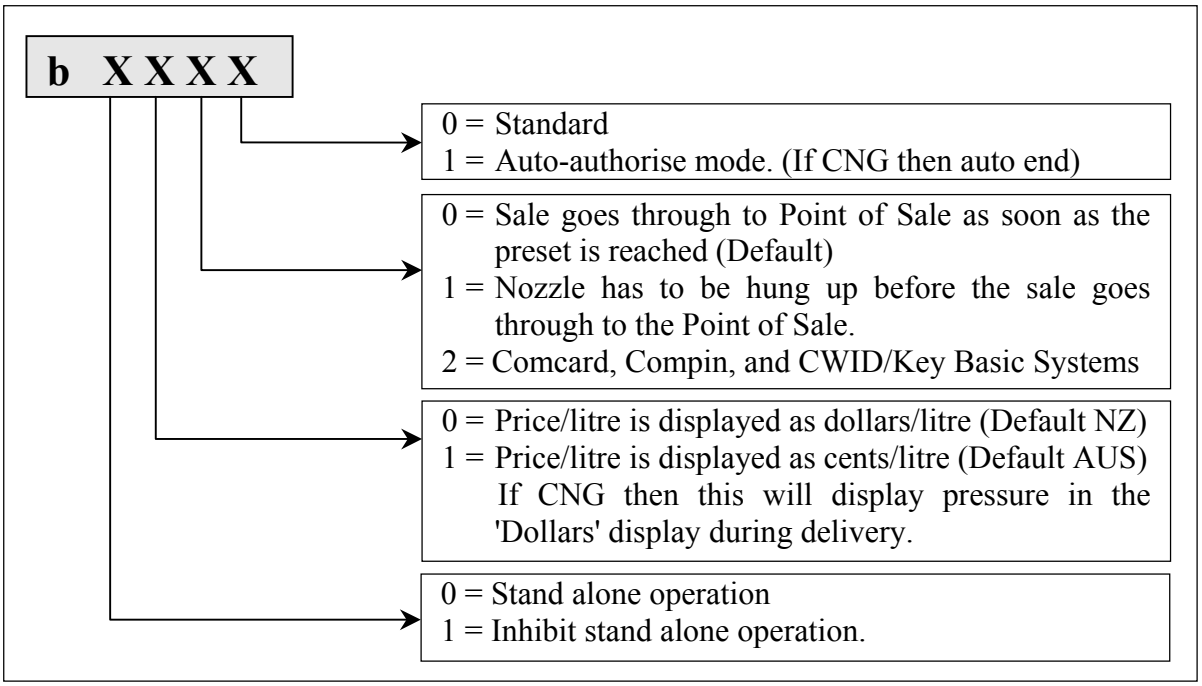


Figure 2. 'b' settings

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 AUTO AUTHORISE mode of operation (used for wharf & aviation sites, 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.
  - This can be adjusted to clients' requirements, between 1 and 256 seconds (refer section 3.1.3 above)
- 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.

CNG Only: If digit 4 is set to zero, the solenoids stay *on* at the end of sequencing until the refuelling assembly is returned to its holder, at which point all outputs turn off. With digit 4 is set to one, all the solenoids turn off at the end of sequencing.

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 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:** 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 (See section 5.2 page 25). 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. truckstops), 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.

Setting the 'b' settings

Refer to section 3.1.1 page 8. While setting the 'b' settings, the price display shows ***'b'*** and the volume display shows ***'bXXXX'***.

3.1.8. 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, as shown in Figure 3 on page 15.

NOTES:

1. For FUTRA software configuration options, see the FUTRA service supplement.
2. **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.

Setting the Configuration Code

Refer to section 3.1.1 page 8. While setting the configuration code, the price display shows *'C'* and the volume display shows *'XXXXX'*.

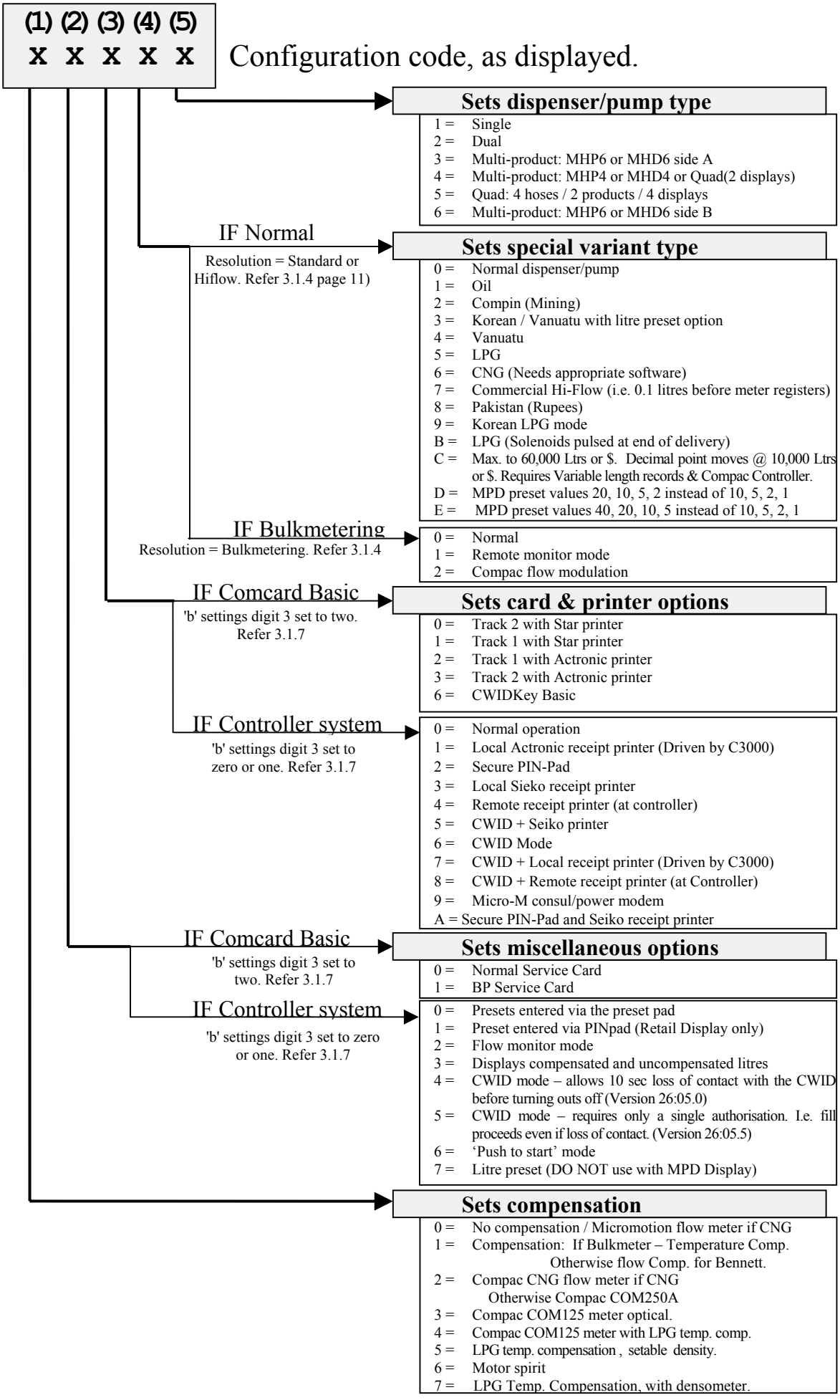


Figure 3. Configuration Code Options

3.2. 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 *' LPG'* - LPG (with compensation and with densometer).

Also for CNG, NOTE:

- With CNG, the no-flow delay has no application and, this setting should be left set as *'n0000'*.
- CNG uses the symbol *'SP'* for setting display resolution instead of the normal dispenser display resolution symbol *'Sr'*
- The setting of decimal places *'SP'* is used in some foreign countries with different currencies. For New Zealand and Australia, leave this set to two decimal places (e.g. *'000'*).

3.2.1. Product Density Factor

This setting is only available for CNG dispensers.

The setting of the product density factor *'dSF' 'X.XXXX'* is necessary for the C4000 to accurately meter and display CNG dispensed in normal cubic meters (nm^3). If the density factor is set to '1.0000', then the unit of the displayed amount dispensed is in kg.

The density factor displayed is actually the inverse of the density. The density factor is in cubic metres per kilogram (e.g. If the display reads '0.8200', this represents a density factor of 0.8200 m^3/kg). Similarly, the units displayed could be litres (equivalent of petrol) by entering a conversion value as the Density Factor.

NOTE: For two hose (dual) CNG dispensers, a Density Factor must be set for each hose.

Setting the Product Density Factor

Refer to section 3.1.1 page 8. While setting the Product density factor, the price display shows *'dSF'* (*'dFb'* for side "B") and the volume display shows *'X.XXXX'*.

3.2.2. 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. Refer to 3.3.3.

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 @ 15ºC. It is always displayed in units of kg/m^3.

Calibrating Specific Density (Densometer)

To acturately calibrate the densometer the temperature reading must be correct. So, **always calibrate the temperature (refer clause 3.2.3) 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 '**LPG**' 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 **0001**.
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 approxiamately the same pressure.

3.2.3. 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 3.1.8

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 section 3.1.1 page 8. While setting the temperature, the price display shows *E* and the volume display shows *'XX.X'*. The temperature is displayed in degrees Celcius.

3.2.4. ACV Valve Flowrate

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 Figure 3 page 15)

Setting ACV Valve Flowrate

Refer to section 3.1.1 page 8. While setting the ACV Valve flowrate, the price display shows *'FLO'* and the volume display shows *'FXXXX'*. The desired flowrate for the system must be entered in litres per minute.

3.2.5. 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 flowrate.

Setting L-Cut

Refer to section 3.1.1 page 8. While setting the “L-Cut”, the price display shows *'LCUT'* and the volume display shows *'LXXXX'*.

3.2.6. 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 flowrate of the system will be halved.

Setting H-Cut

Refer to section 3.1.1 page 8. While setting the “H-Cut”, the price display shows *'HCUH'* and the volume display shows *'HXXXX'*.

3.2.7. 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 section 3.1.1 page 8. While setting the “F-Cut”, the price display shows *'FCUH'* and the volume display shows *'FXXXX'*.

3.3. Parameter Switch

Refer to Figure 1 page 1 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, *'SEQ'* (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

3.3.1. 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 progran version number.

3.3.2. 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. If a true multi then only two hoses (one per side) can operate at any time)
4. Multi (e.g. one C4000 controls three hoses, but only one hose may be in operation at any time)

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

Setting the '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.	

Setting the 'Price ' for the 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 'Pr 1' 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.	

Setting the 'Price ' for the '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 'Pr 1' 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'. 'Pr 2' or 'Pr 3' 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:

1. 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.
2. The dispenser/pump will stop when the dollar amount reaches:

   $999.99 or high-flow $9999.9,

   or the litres amount reaches
   999.99l or high-flow 9999.9l,

   whichever occurs first.

3.3.3. 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/m^3) 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/m^3) is set at the dispenser.

If the C4000 is in Bulkmeter mode (See clause 3.1.4) 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. **This is not available in other modes.**

Refer to section 3.1.1 page 8. While setting the Specific Density, the price display shows *'dEn'* and the volume display shows *'XXX.X'* the density (Kg/m^3) @ 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/m^3 @ 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.

3.3.4. 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.

3.3.5. 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. Refer to paragraph 11.1 for the meaning of these values.

3.3.6. 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 *'SEQ','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.

3.3.7. 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. Refer 3.1.7).

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.

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.

3.3.8. Setting the Access Code

This is only available on Comcard or CWIDKey Basic systems (i.e. 'b' setting digit 3 = 2. Refer to 3.1.7).

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 *'ACXXXX'* 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. See also Scrolling Tote Option in Section 5.2 page 25.

4. PRINTER SETUP

4.1. Comcard, Compin, and 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).

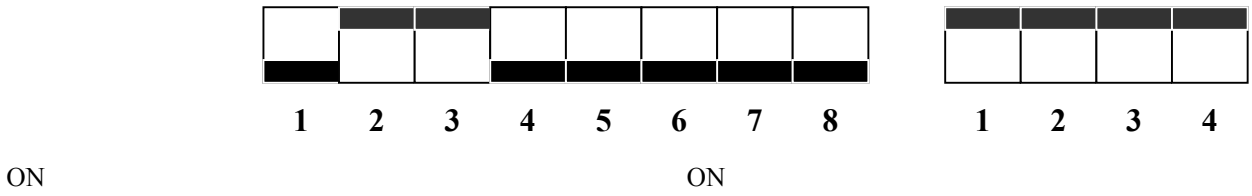


Figure 4. Star printer dipswitch settings

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

4.2. Printer Self Test

To carry out the self-test, press and hold down the *FEED* and *ON LINE* buttons. At the same time, switch the power on.

5. DISPLAYING AND PRINTING TOTALS

5.1. 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.

5.2. Scrolling Tote Option

This is only available on Comcard, Compin, and CWIDKey Basic systems (i.e. 'b' setting digit 3 = 2. Refer 3.1.7).

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'.

5.3. Using a Totals Only - Report Printer

This is only available on Comcard, Compin, or CWIDKey Basic systems (i.e. 'b' setting digit 3 = 2. Refer 3.1.7).

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 comm's. 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:

1. All totals mentioned above are non-resetable totals (the only way they can be cleared is by replacing the C4000 memory IC 'chip').
2. 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.

5.4. 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).

5.4.1. 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 PINpad must also be connected to the C4000 and the **third** digit of the Configuration Code must be set to **'1'** or **'3'** (See Section 3.1.8)

- 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 PINpad 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. Pinpad reads: "LOAD PRESET"
    2. Press: "ENTER"
- If the nozzle is lifted:
    1. Pinpad reads: "TAKE FUEL"

NOTE:

If the Receipt Printer is not operational (e.g. out of paper), then when the PINpad 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 connect 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.

5.4.2. 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 PINpad 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 PINpad 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 PINpad is installed on the pump/dispenser. (See Section 3.1.8).

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

6. BASIC SYSTEMS (COMCARD, COMPIN, & CWIDKEY)

For these systems to operate the **'b' setting digit 3** must be set to two. 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 (see section 4 for printer setup details and sections 5.2 and 5.3 for details on how to print or display totals). These systems can have a maximum of 99 cards/pins/keys.

6.1. 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. (refer to sections 3.3.7 and 3.3.8 to set access and card numbers).

Note: In older Comcard basic systems, card number 99 was reserved for servicing.

All Comcard Basic systems will have a cardreader (refer section 10.3.6 page 41) 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 (see section 6.3.1 below)

6.2. 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 section 3.1.8 page 14) 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.

6.3. CWIDKey Basic

The CWIDKey Basic system uses a CWID (Compac wireless Identifier) key to initiate a transaction. These systems have a CWIT (refer Compac Wireless Transceiver section 10.3.7 page 41) and 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 excet that digit 3 of the configuration code (refer section 3.1.8 page 14) 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.

6.3.1. 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 key number. 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.

7. ERROR CODES

Error Code	Fault	Action
Err 3	No price set.	Set a price at the pump or at the controller.
Err 4	CWIT offline.	Check connections. Change CWIT PCB.
Err 7 [1]	Excess flow.	Check for air.
Err 8 [2]	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 E^2prom '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 & CNG only).	Reconnect pressure probe or replace.

NOTES:

1. For LPG, Error 7 also occurs if flow rate exceeds 100 litres/min.
2. 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.

Further error messages are covered in the table on the following page.

7.1. Other Error Messages

On Pump LCD Display	*On PIN Pad Dot Matrix Display (if Connected)*	*Explanation (if required)*
rEPAS	Pass Again	Card not read properly, try re-swiping. In addition, C4000 may be configured for the wrong cardreader track, or the card or cardreader could be faulty.
HOLD	System not ready	Pump no longer communicating with Central Controller.
:00		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 cutout 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.

8. INDICATOR LED'S

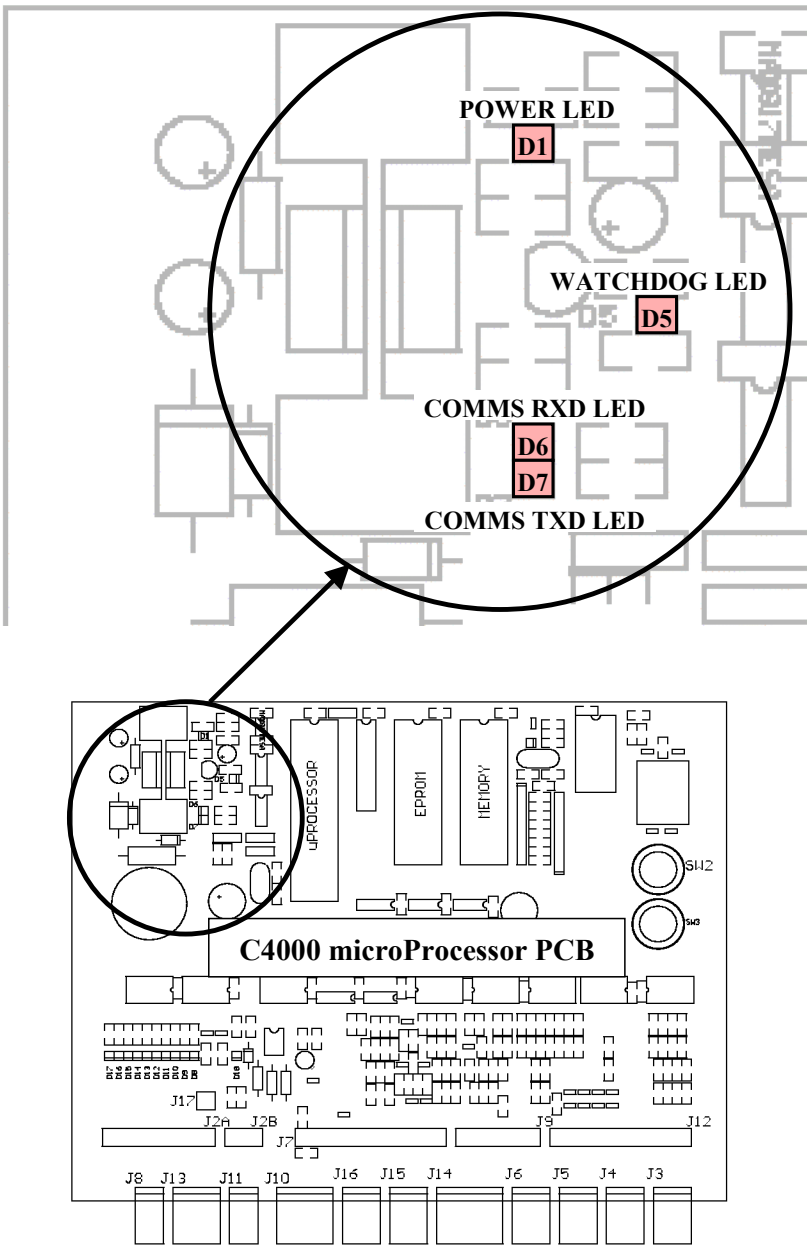


Figure 5. Location of Power, Watchdog, RXD, & TXD LEDs

8.1. 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.

8.2. 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.

8.3. TXD and 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).

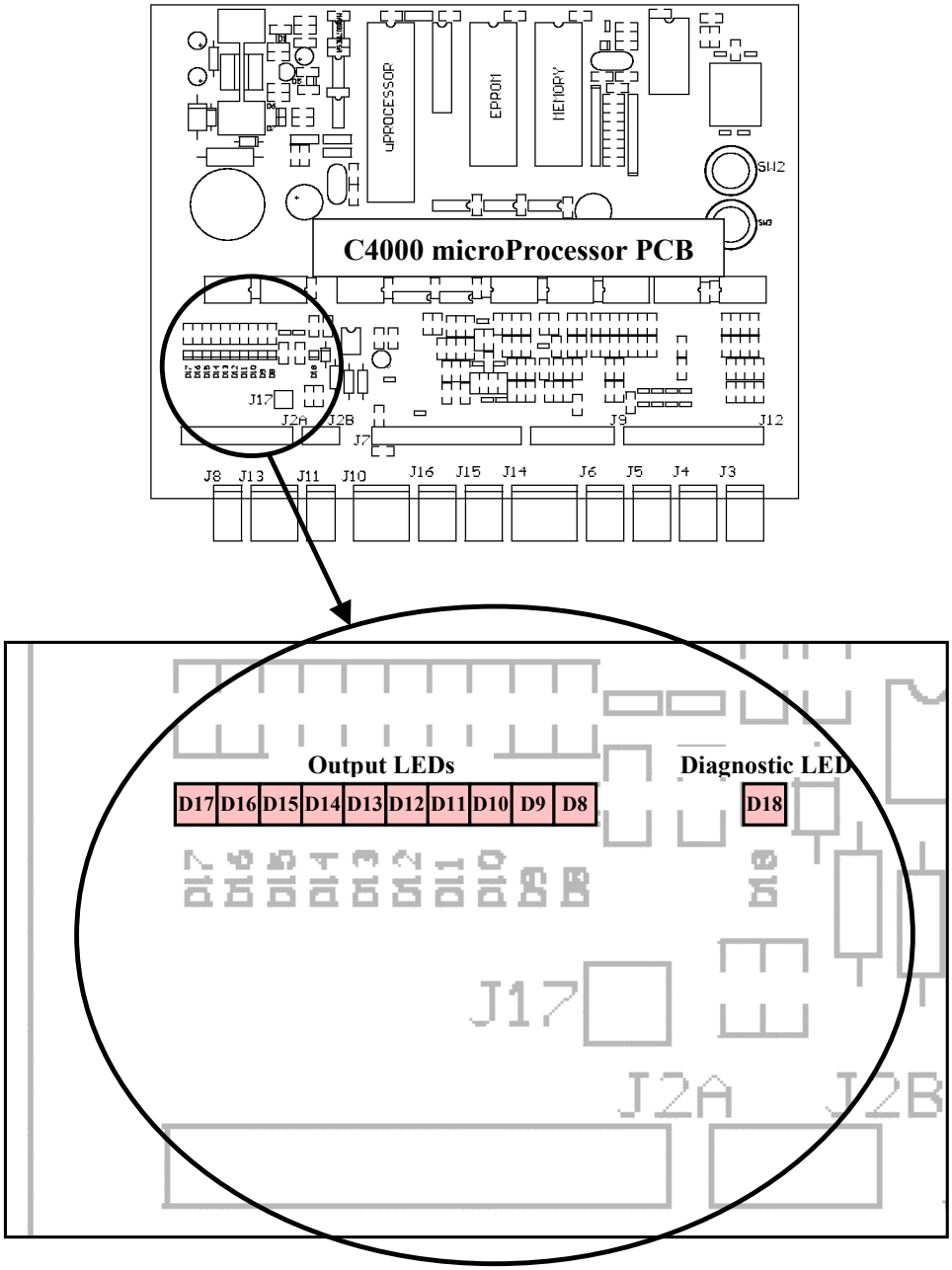


Figure 6. Location of Output and Diagnosis LEDs

8.4. 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).

8.5. 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.

9. SOLID STATE RELAYS (TRIACS)

9.1. 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.

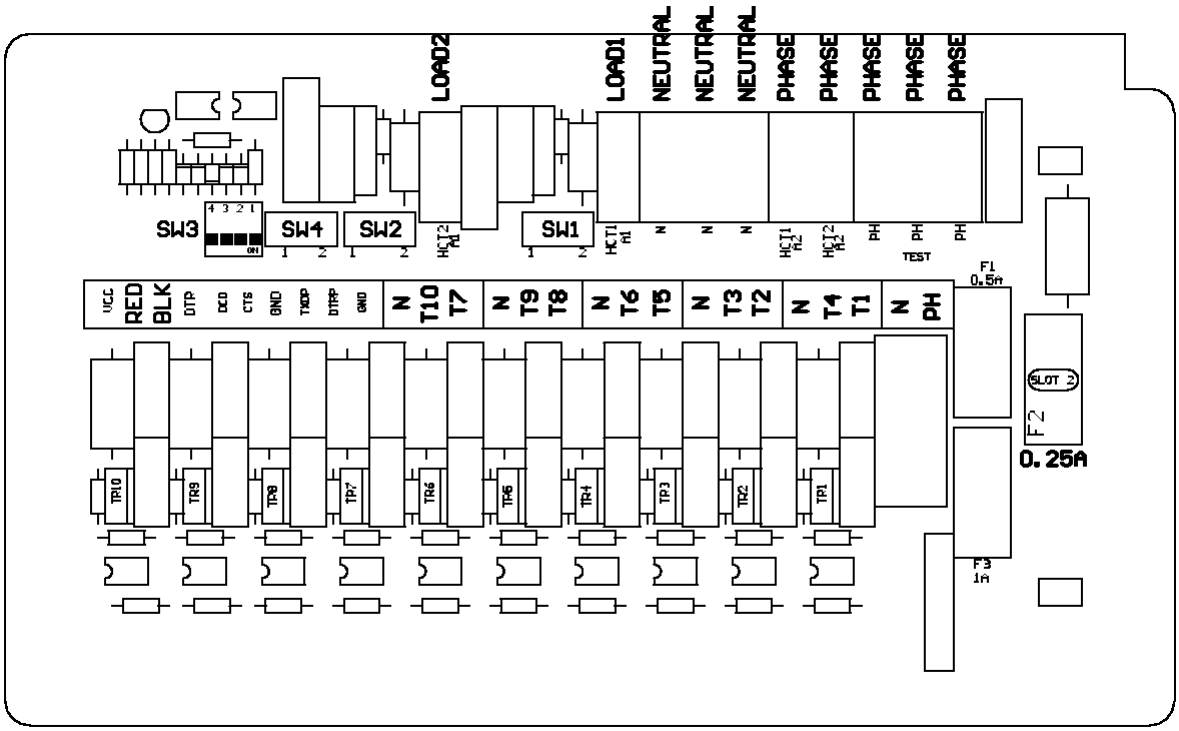


Figure 7. Location of Solid State Relays (Triacs)

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.

Power Terminal	Symbol	Function		High / Low Current Output
		Single / Dual	Quad	
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)

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 = 2) —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 = Mid) —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'.

Power Terminal	Function			High / Low Current output
	LPG Single/Dual	CNG	Bulk Meter	
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)

9.2. 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).

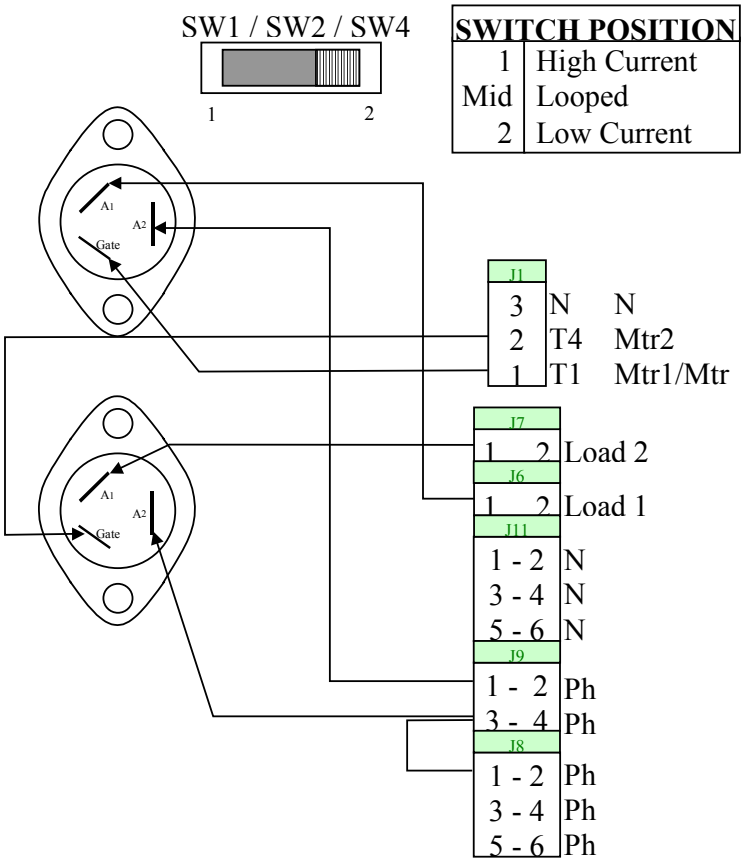


Figure 8. High Current Triac Option

10. ELECTRICAL WIRING

10.1. 230 Volt Wiring

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

On board 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 (refer to paragraph 9 above).

10.2. Communications (Comms) Wiring

Communication cables connect to the comms terminals marked *Red and Black* (refer Figure 7). **Note** that the Communications 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

10.2.1. Comms DIP Switch settings

The Comms dipswitches are on the C4000 power supply PCB (see Figure 7 on page 35)

Comms Dipswitches	
Sw	Std Comms
1	ON
2	OFF
3	ON
4	OFF

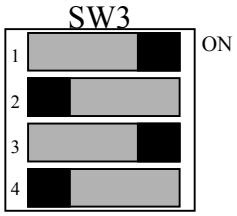


Figure 9. Comms Dipswitches On C4000

- 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

10.2.2. 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 (See Appendix A (IS Cable **Microprocessor - IS Power Supply**)) must be setup to connect to the Gilbarco interface board. The Comms still connects to the *Red* & *Black* terminals as with the standard Comms.

10.3. Intrinsically Safe Wiring

The location of the various connectors are shown in Figure 1 on page 1.

10.3.1. 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.

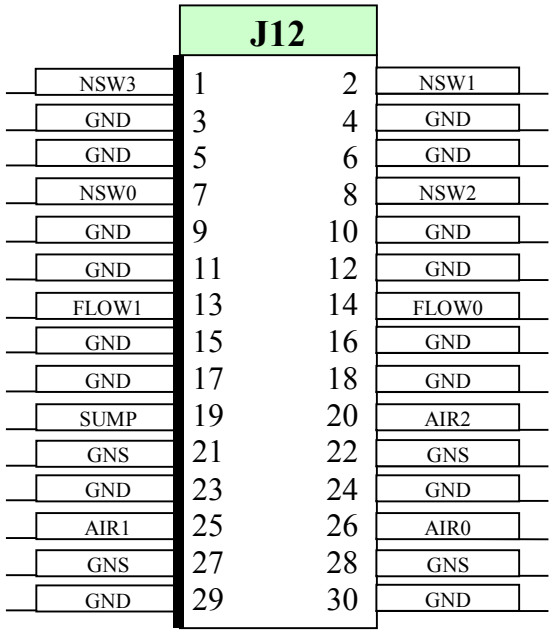


Figure 10. Connector J12 (Nozzle, Air, Sump, and Flow switches)

The Air cut-out switches are to be connected between the AIRx and GNS pins on the J12 connector (see Figure 10). If there is more than one head controlling a pump (e.g. MPD6), then the Air detector cut-out switch must be connected to both heads. Ensure that the AIRx terminals are joined and the GNS terminals are joined. DO NOT connect the GNS terminal on one head to the AIRx terminal on the other.

10.3.2. 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.

10.3.3. Sump Switch

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

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

The Sump Switch is wired into the SUMP and GNS terminals on the J12 connector (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. DO NOT connect the GNS terminal on one head to the SUMP terminal on the other.

10.3.4. 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.

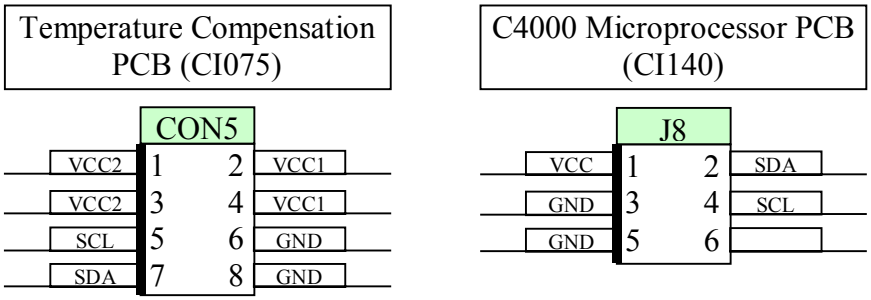


Figure 11. Temperature Compensation Connectors.

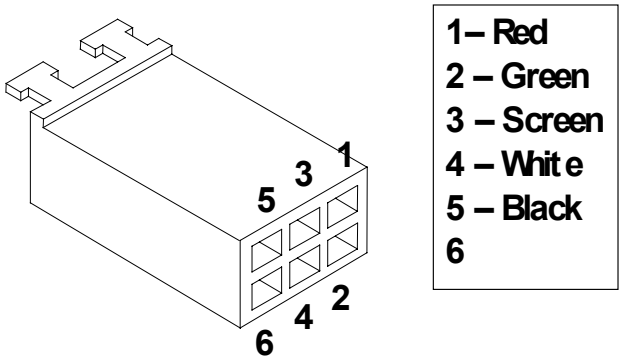


Figure 12. Connector to C4000 MicroProcessor PCB (J8)

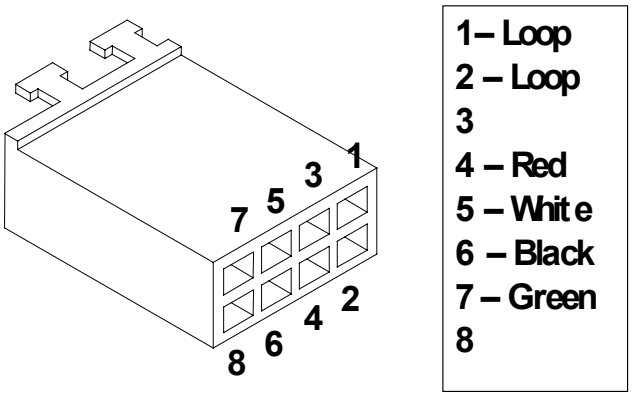


Figure 13. Connector to Temperature Compensation PCB (CON5)

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

10.3.5. 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.

10.3.6. Card-readers

The C4000 can drive two Cardreaders. They plug into the C4000 Microprocessor PCB (Connectors J15 & J16). The Cardreaders 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.

10.3.7. Compac Wireless Transceiver

The CWIT PCB is mounted in a separate enclosure. Connector *'CON5'* on the CWIT PCB (see Figure 15) connects to J13 on the C4000 Microprocessor PCB (see Figure 1) with an eight wire cable (see Figure 14)

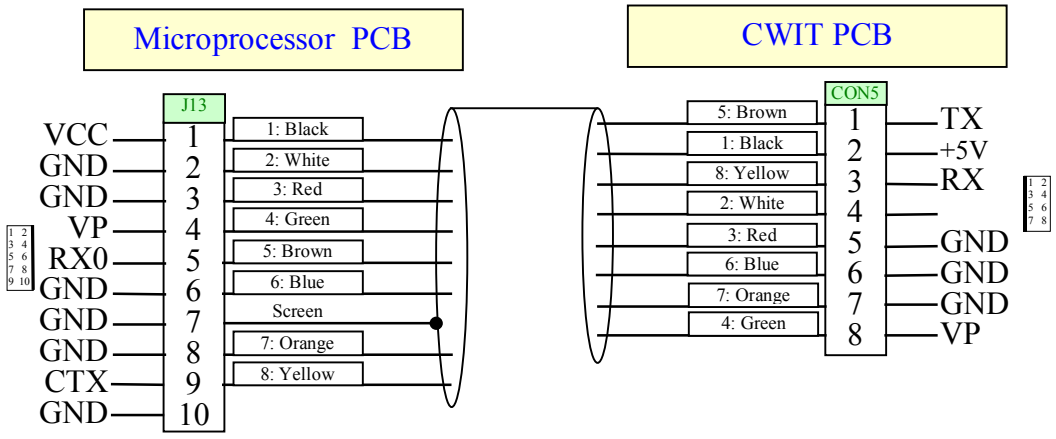


Figure 14. The CWIT (CON5) to Microprocessor (J13) Cable.

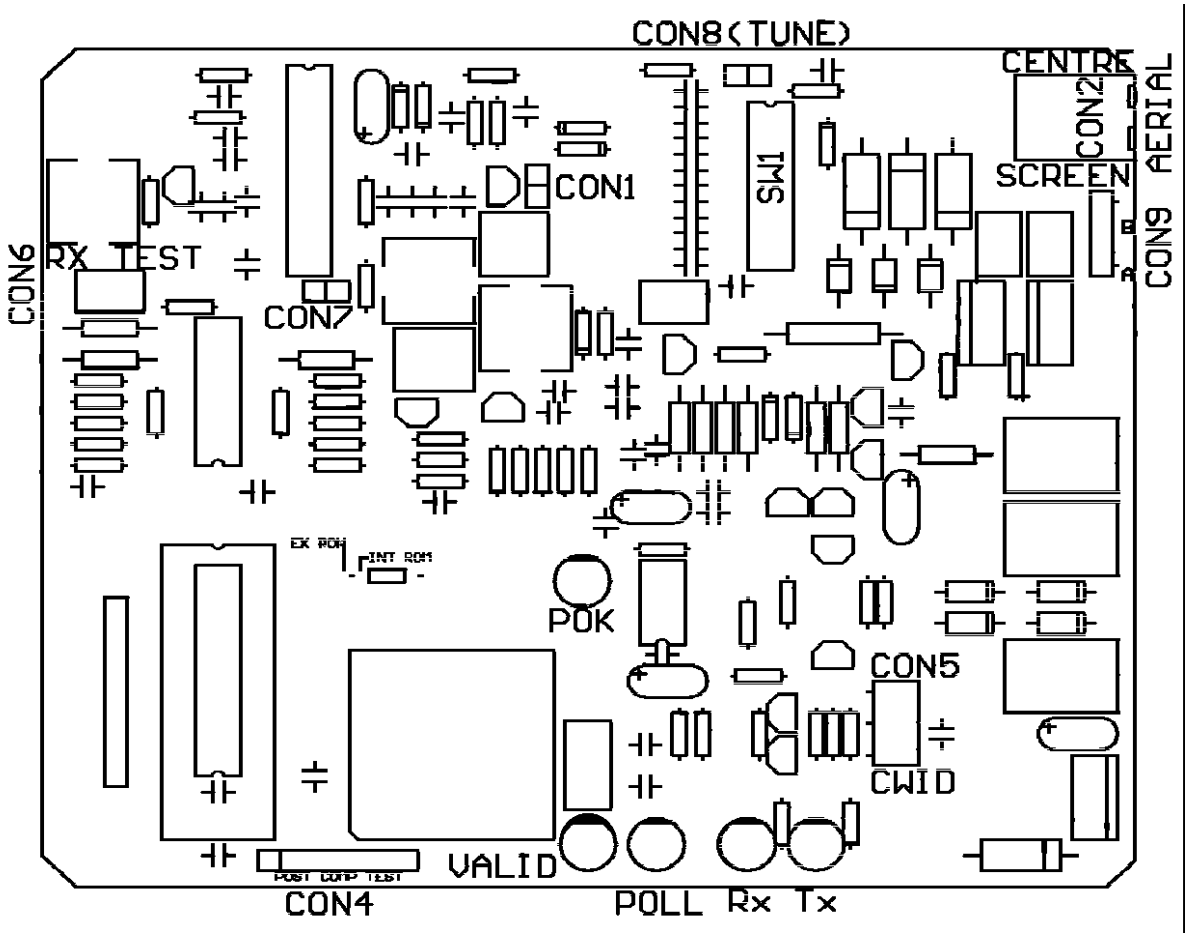


Figure 15. The CWIT (CI101 issue D) PCB

Tuning the aerial

Whenever the CWIT PCB is changed, the aerial will need to be tuned.

1. Connect a Multimeter (set to Volts) to CON8.
2. Place a shorting link across pins 2 & 3 of CON4.
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 capacitance values being:

Dipswitch (SW1)	Capacitance (nF)
1	4.7
2	2.3
3	1.33
4	0.66

Dipswitch (SW1)	Capacitance (nF)
5	0.33
6	0.1
7	0.1
8	0.1

4. The voltage reading must be above 28 Volts.
5. Remove the shorting link fitted at 2 above.

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

The C4000 has a 32 pin connector (J7 see Figure 16) which can be used to connect up to four display-preset pairs. Refer to Figure 1 for the location of connector *'J7'* on the Microprocessor PCB.

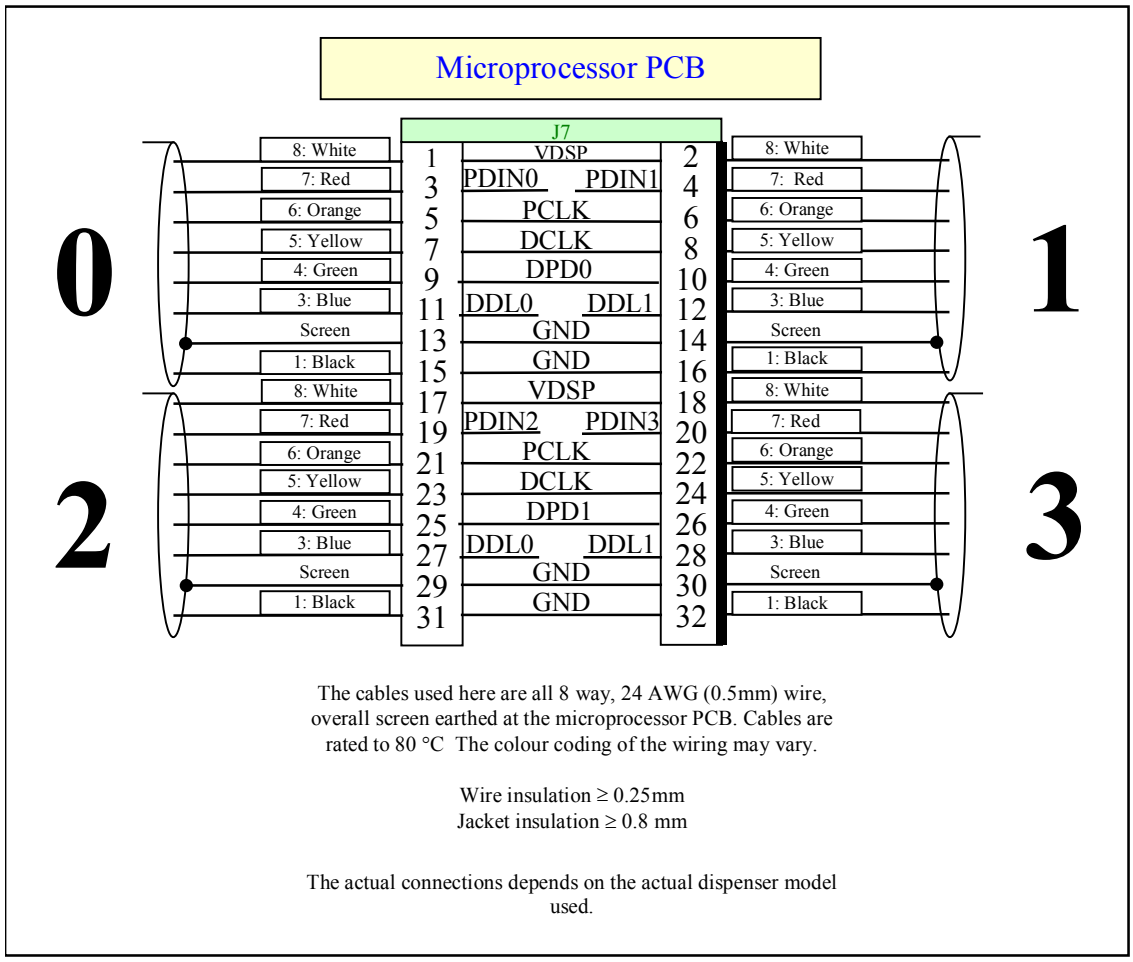


Figure 16. Microprocessor Display Connector (J7)

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.

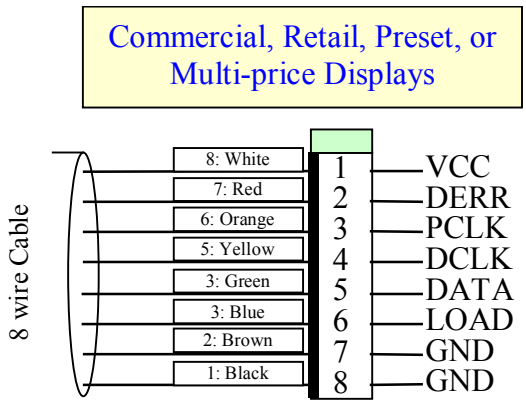


Figure 17. Display Connector

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.

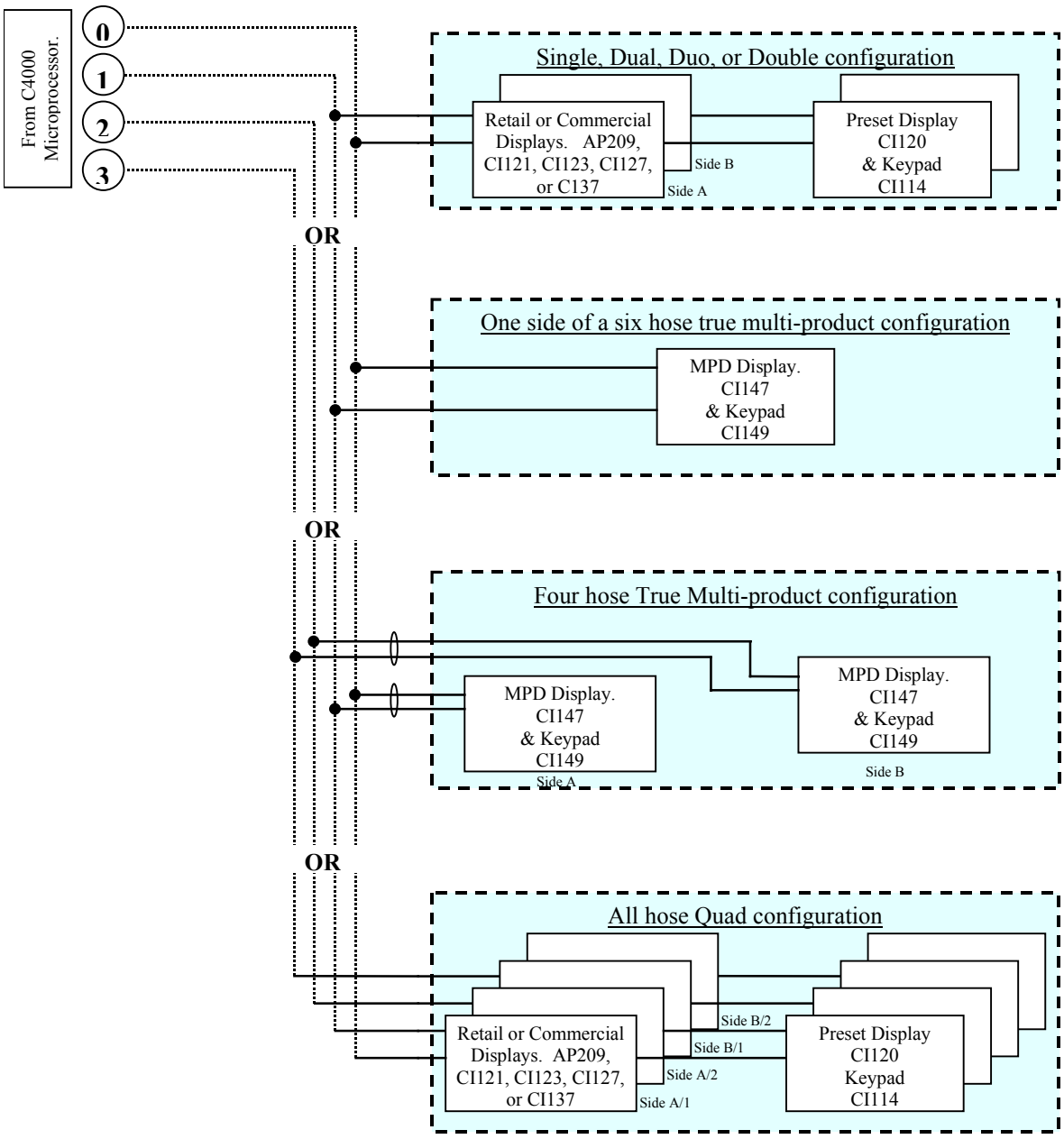


Figure 18. Display Connections for Various Dispenser Models.

10.3.9. Modem

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

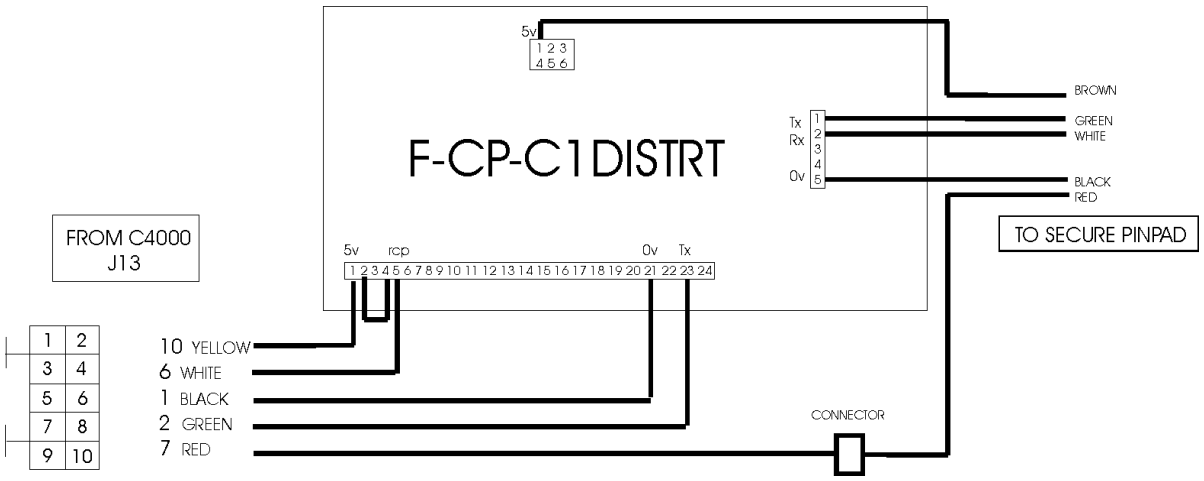
10.3.10. Standard PIN Pad Unit

10.3.11. Secure PIN Pad Unit

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

Note: The Secure Pinpad / C4000 combination only works with old type Central Controllers

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



10.3.13. Encoder

The rotary encoder translates meter turns into electrical pulses. Each turn of the Bennett meter equals approximately $^1/_2$ a 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

10.3.14. 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.

10.3.15. 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 Microprocessr 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.

10.3.16. CNG Dispenser Shut-Off Switch

The CNG Shut-Off Switch is a normally open switch, that when operated, shorts-out the *Nozzle 3* and *0V* input terminals. This action causes all of the standard triac outputs for the gas pressure bank switching solenoids to be disabled (de-energise) and for output 10, labelled 'T10' to be energised. The 'T10' output can then be used to disable the CNG Compressor if so desired.

10.3.17. Electromechanical Totalisers

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

10.3.18. 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-resetable.

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.

10.4. 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:
   - K factor '*F*' (all but CNG)
   - No flow delay '*n*'
   - Pre-set cut-off margin '*PCuH*'
   - 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*' ('*SP* on CNG)
   - Configuration '*C*'
   - '*b*' Settings
   - Price '*Pr*' or '*P*'
   - Density '*d*' (bulkmeters only)
   - Pump number '*Pn*'
   - Sequencing Rate '*SEQ*' (CNG only)

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

3. Electronic and mechanical totals should also be recorded.
4. 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 (see Section 5.2 page 25).

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

5. Turn off power.
6. 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.)
7. 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).
8. Turn on power.
9. Check that the data recorded in Steps 2 and 4 is still present, if not re-enter.
10. Check the electronic totals, if not as before then give 'before' and 'after' totals to relevant people on site.
11. 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.
12. Test pump operation.

WARNING:

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.

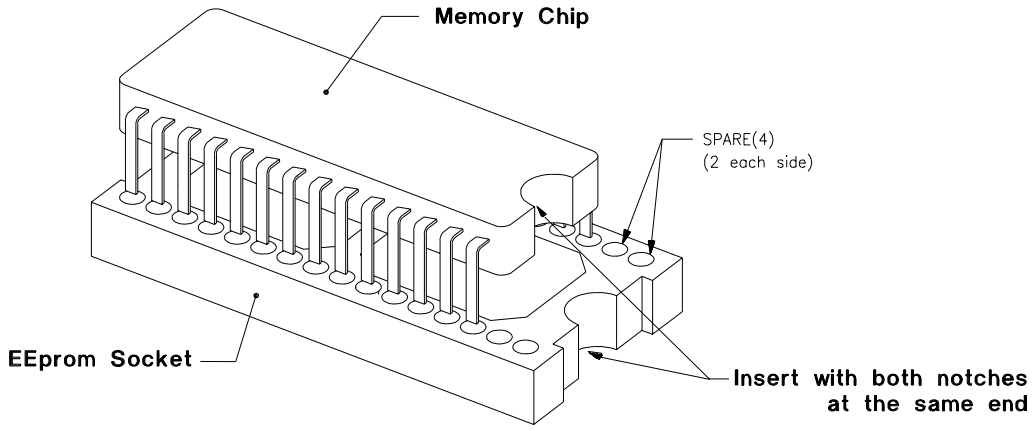


Figure 19. Software IC Insertion.

11. 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 okay.* 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*
Solenoid not de-energising	Is Solid State Relay LED on? Yes - *Check Nozzle Switch is releasing* No - *Select spare Low Current Solid State Relay.* *Replace C4000 PCB if fault not found* *Fit 22KΩ 5Watt resistor.*
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* *Check condition of display plugs.* No - *Replace keypad. If problem still exists, replace preset PCB.*
Secure PIN Pad - Display Off	Is PINpad backlighting on? Yes - *Check 5V and TX wires for continuity.* NO - *Check the 0V wire for continuity and that the plug is firmly in place.* *Replace Secure PIN pad if fault is not found.*
Secure PIN Pad not accepting numbers	Is PINpad 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 (see page 24)* *Carry out self test (see page 24)* No - *Check cable and plug.* *If no fault found, contact Compac Help Desk.*

11.1. End of Sale Indications

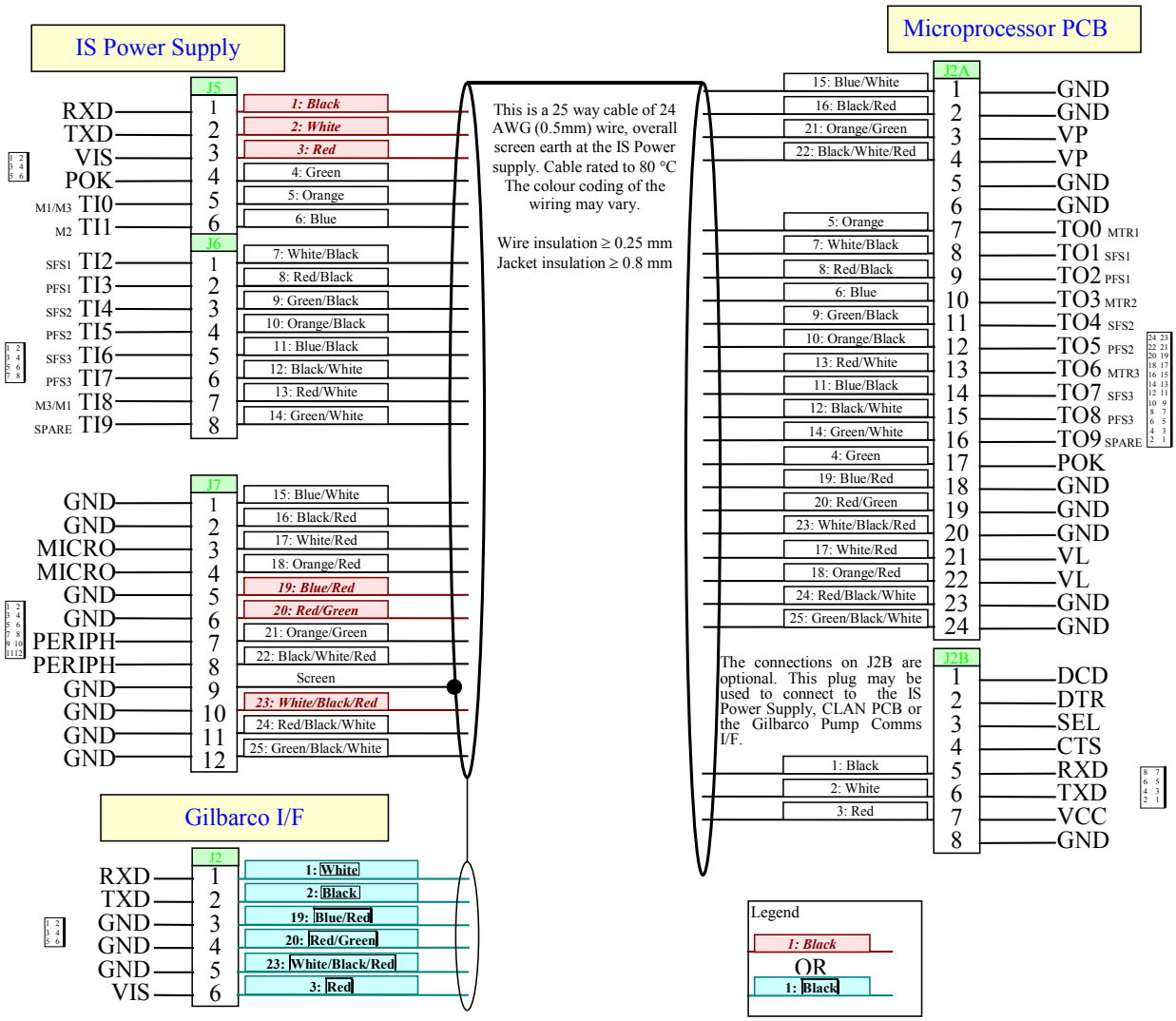
The C4000 can display the reasons the last sale ended. This information is displayed as a number, which appears in the price-per-litre panel, when setting the pump number. The following table gives the reasons corresponding to each number. See paragraph 3.3.5 for method of displaying numerical indicator.

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

12. GLOSSARY OF TERMS

TERM	DESCRIPTION
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.
CPU	Central Processing Unit.
CWID	Compac Wireless IDentifier.
CWIT	Compac Wireless Transceiver.
Encoder	A device that translates rotary motion into electronic pulses. Often refered to as a pulser.
Head	Dispenser calculator/Indicator. C4000 PCB, complete with power supply.
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	E^2PROM chip that stores parameters and/or transaction & totals.
PCB	Printed Circuit Board.
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.

APPENDIX A (IS CABLE MICROPROCESSOR - IS POWER SUPPLY)


IS Power Supply
Microprocessor PCB
J5
RXD 1 1: Black
TXD 2 2: White
VIS 3 3: Red
POK 4 4: Green
M1/M3 TI0 5 5: Orange
M2 TI1 6 6: Blue
J6
SFS1 TI2 1 7: White/Black
PFS1 TI3 2 8: Red/Black
SFS2 TI4 3 9: Green/Black
PFS2 TI5 4 10: Orange/Black
SFS3 TI6 5 11: Blue/Black
PFS3 TI7 6 12: Black/White
M3/M1 TI8 7 13: Red/White
SPARE TI9 8 14: Green/White
J7
GND 1 15: Blue/White
GND 2 16: Black/Red
MICRO 3 17: White/Red
MICRO 4 18: Orange/Red
GND 5 19: Blue/Red
GND 6 20: Red/Green
PERIPH 7 21: Orange/Green
PERIPH 8 22: Black/White/Red
GND 9 Screen
GND 10 23: White/Black/Red
GND 11 24: Red/Black/White
GND 12 25: Green/Black/White
This is a 25 way cable of 24 AWG (0.5mm) wire, overall screen earth at the IS Power supply. Cable rated to 80 °C The colour coding of the wiring may vary.
Wire insulation ≥ 0.25 mm
Jacket insulation ≥ 0.8 mm
J2A
15: Blue/White 1 GND
16: Black/Red 2 GND
21: Orange/Green 3 VP
22: Black/White/Red 4 VP
5 GND
6 GND
5: Orange 7 TO0 MTR1
7: White/Black 8 TO1 SFS1
8: Red/Black 9 TO2 PFS1
6: Blue 10 TO3 MTR2
9: Green/Black 11 TO4 SFS2
10: Orange/Black 12 TO5 PFS2
13: Red/White 13 TO6 MTR3
11: Blue/Black 14 TO7 SFS3
12: Black/White 15 TO8 PFS3
14: Green/White 16 TO9 SPARE
4: Green 17 POK
19: Blue/Red 18 GND
20: Red/Green 19 GND
23: White/Black/Red 20 GND
17: White/Red 21 VL
18: Orange/Red 22 VL
24: Red/Black/White 23 GND
25: Green/Black/White 24 GND
The connections on J2B are optional. This plug may be used to connect to the IS Power Supply, CLAN PCB or the Gilbarco Pump Comms I/F.
J2B
1 DCD
2 DTR
3 SEL
4 CTS
1: Black 5 RXD
2: White 6 TXD
3: Red 7 VCC
8 GND
Gilbarco I/F
J2
RXD 1 1: White
TXD 2 2: Black
GND 3 19: Blue/Red
GND 4 20: Red/Green
GND 5 23: White/Black/Red
VIS 6 3: Red
Legend
1: Black
OR
1: Black

COMPAC

MADE TO MEASURE

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