1. DESCRIPTION

1.1. General

The Compac 3000 is a microprocessor-based circuit board designed for use in liquid and gaseous fuel metering. 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.

All descriptions, tables, graphics and drawings in this manual relate specifically to Issues 'L', 'M' and 'P' of the C3000 PCB.

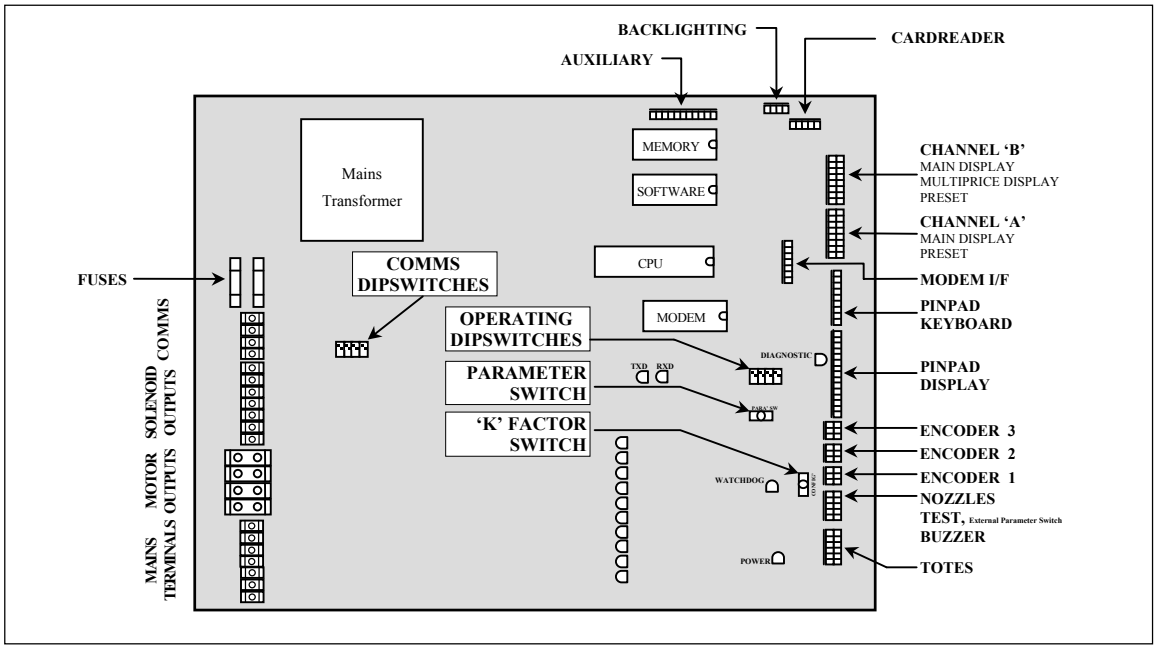


Figure 1. Layout of C3000 Printed Circuit Board

The C3000 microprocessor, commonly referred to as the 'head', is powered by an intrinsically safe power supply, and is designed to operate in both a class 1 zone 1 area and in the vapour-proof box 1.2m above the ground level. If the 'head' is used in a class 1 zone 1 area then the power supply and the 230V output circuitry is encapsulated.

The C3000 ('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 Meter correction.
- 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):
  - Litres only
  - Dollars, litres and price (5 x 5 x 4) & (6 x 6 x 4)
  - Litres, Rate of Flow and Preset
  - Multi-price display
  - Preset
  - Last Sale, kilograms, dollars and price (CNG only)
- 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 C3000 head, and its associated circuits and wiring, is certified 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 only to be repaired 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 C3000 head are:

- Remote Distribution Board
- Encoder
- Displays
  - Litres
  - Dollars, litres and price
  - Litres, rate of flow and preset
  - Multi-price display
  - Preset
  - Last Sale, kilograms, litres and price (CNG only)
- Temperature compensation
- Card-reader
- PIN/Odometer Pad
- Printer
- Modem
- Tank Gauging Probe (only available with Futra Option)
- Mechanical Totaliser (Tote)
- Nozzle Switch

2.2. Configurations

The C3000 'head' can be used with the equipment listed below in the following standard configurations:

2.2.1. Single Commercial

Standard Options:

- Litres only display, two - one per side
- Motor circuit, one only
- One Encoder
- One Nozzle Switch
- C3000 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 circuits
- Two Encoders
- Two Nozzle Switches
- C3000 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
- C3000 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
- C3000 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
- C3000 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
- C3000 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
- Four Motor Outputs - two per C3000 Head
- Two C3000 Heads (for Issue "L")
- One C3000 Head (for Issue "M") and Version 25 software
- 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
- Four Motor Outputs - two per C3000 Head
- Two C3000 Heads (Issue "L")
- One C3000 Head (Issue "M") and Version 25 software

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
- Six Motor Outputs - three per C3000 Head
- Two C3000 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
- Six Motor Outputs - two per C3000 Head
- Three C3000 Heads (Issue "L")
- Two C3000 Heads (Issue "M") and Version 25 software

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
- C3000 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 C3000 to operate as desired, 3 things must be set:

1. Operating Dip Switches
- A Block of 4 sliding switches.

2. Configuration (K Factor) Switch Settings
- This switch accesses different options that must be set appropriately for the particular type of dispenser.

3. Parameter Switch Settings
- This switch is used to conduct the Display Segment Test, set price (product density - if a bulkmeter), and set pump number. Also, when the C3000 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 3.4.8).
- With CNG dispensers, the sequencing rate between 'banks' is also set using the parameter switch (reference section 3.4.6).

The positions of the above switches are shown on Figure 1, page 4. Also, note that a second, more readily accessible parameter switch is mounted in all pumps/dispensers. This gives quick access for service station staff to make changing price easier. Set up of the C3000 must be done in the following sequence:

1. Operating Dipswitch Settings (power OFF the C3000 before changing)
- To be set, before 'powering up'.

2. '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 3.2.8.
Display Resolution	'Sr'	'X.XX'	Refer section 3.2.4.
Temperature	'E'	'E XXX.X'	Refer section 3.3.3. LPG and Bulk-metering only
ACV Flowrate	'FLO'	'r XXXX'	Refer section 3.3.4. Bulk-metering only
Specific Density	'dEn'	'XXX.X'	Refer section 3.3.2. LPG only.
No-flow cut-off	'n'	'n XXX'	Refer section 3.2.3
Solenoid delay	'Sd'	'd XXX'	Refer section 3.2.5
Preset Cut-Off	'PCut'	'PC X.XX'	Refer section 3.2.6
'b' settings	'b'	'b XXXX'	Refer section 3.2.7
'K' Factor	'F', 'Fb', 'F1', 'F2', or 'F3'	'X.XXXX'	Refer section 3.2.2
H-Cut	'HCut'	'HXXXX'	Refer section 3.3.6. Bulk-metering only
L-Cut	'LCut'	'LXXXX'	Refer section 3.3.5. Bulk-metering only
F-Cut	'FCut'	'FXXXX'	Refer section 3.3.5. Bulk-metering only
Density Factor	'dSF'	'X.XXXX'	Refer section 3.3.1. 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).

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

3.1. Operating DipSwitch Settings

The location of the block of four DipSwitches on the Processor Board is shown in Figure 1 on page 4.

Dipswitch	ON/OFF	Brief description of dipswitch function
1	OFF	Display Error checking on.
	ON	New style displays (Use 8x1 pinheader connections)
2	OFF	Normal operation
	ON	Comcard or CWIDKey Basic systems
3	OFF	Normal operation. (Pump start is controlled by the nozzle switch)
	ON	Auto-authorise mode. (Pump starts on being authorised)
4	OFF	Will operate “stand alone”. (does not require a controller)
	ON	Requires the presence of a controller to start the pump.

3.1.1. Switch 1

If Switch 1 is **OFF,** the display will automatically check the data.

- Dollars
- Litres
- Price

NOTE: In order to use an old style display, wiring modifications must be done if it is to be used on Issue "L" and/or Issue "M".

If Switch 1 is **ON,** the latest type Commercial, Retail, or Multi-Purpose displays are being used.

- Litres
- Dollars, Litres, Price
- Litres, Rate of Flow, Preset

NOTE: The old type of display pin is a 6 x 2 (Issues A thru E) and the new type of display pin is an 8 x 1.

3.1.2. Switch 2

If Switch 2 is **ON,** the head is set up for Comcard 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.

If Switch 2 is **OFF**, the system will function as a conventional dispenser/pump.

- For the Bulk Meter Register, Switch 2 must be **off**. Comcard, and CWIDKey Basic systems are **not** available in this mode.

3.1.3. Switch 3

If Switch 3 is **ON**, then 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 255 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.

If Switch 3 is OFF, then the pump/dispenser software defaults to conventional operation, (i.e. The nozzle switch controls the pump start after initial authorisation).

CNG Only: If switch 3 is OFF, 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 this switch ON, all the solenoids turn off at the end of sequencing.

3.1.4. Switch 4

The function of Switch four (4) 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 Switch two (2).

- **Basic Systems:**

  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 switch 4 setting.

  By placing dipswitch 4 ON, the 'Scrolling Totes' option is selected (See section 5.2 page 28). 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 (Switch 2 OFF)**

  If Switch 4 is **OFF**, the pump/dispenser can be operated in *'stand-alone'* mode irrespective of the pump/dispenser number loaded.

  If Switch 4 is ON, 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 dipswitch 4 is ON 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, dipswitch 4 must be left **ON**. For the Bulk Meter Register configuration, when Switch 4 is **OFF,** the unit will work in the

'*stand-alone'* mode. When Switch 4 is **ON**, the unit must be connected to a Compac Central Controller.

3.1.5. Typical Switch Settings

OPERATING DIPSWITCHES				
1	**2**	**3**	**4**	**Typical models**
ON	OFF	OFF	OFF	C40P or C80S Retail pump/dispenser to EFTPEC
ON	OFF	OFF	ON	M80P-1 Commercial Pump @ a commercial site
ON	ON	OFF	OFF	M80P-C-1 Commercial Pump with Comcard Basic
ON	OFF	OFF	ON	M80P-C-1 with a central controller
ON	OFF	OFF	OFF	Korean Kerbside
ON	OFF	OFF	OFF	M80P-CPP-1 with Futra software.
ON	OFF	ON	ON	C3000-D-P-230-Z1-BL-C-PP-CC4800 Bulkmeter register

3.2. 'K' Factor Switch

The 'K' Factor switch is located on the C3000 PCB as shown in Figure 1 on page 4. The 'K' Factor switch is used to access and change various set-up options of the C3000 head. The following flow charts detail the operation of setting up the C3000 head:

Any change of set-up effected by the 'K' Factor switch takes effect as soon as the C3000 resets. The power supply does not have to be interrupted.

NOTE: The C3000 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 C3000 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.

3.2.1. 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 C3000 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.

3.2.2. Calibration ('K') Factor

(See also section 10.3.11 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 C3000 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 3.2.1 page 13. 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 (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.

3.2.3. No Flow Cut-Off Timer

Under normal conditions to end a transaction on a C3000 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 3.2.1 page 13. While setting this value the price display will indicate ***'n'*** and the volume display will indicate ***'nXXXX'.***

3.2.4. Display (Litres) Resolution

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

	Display Type		
Display Resolution	**5-Digit**	**6-Digit**	
Standard (default)	0.00	0.000	
Hi-Flow	0.0	0.00	See Note 2
Bulk-metering	N/A	00000.0	
		000000	
		000000[0] [0] is not displayed	

NOTES:

1. Displaying of three decimal places is only available when six digit displays are used.
2. When the resolution is set to one decimal place (0.0), the preset display is for four whole digits. The standard is three digits for a retail display (i.e. the maximum presetable amount is then 9999 litres instead of 999 litres).
3. 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).

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 C3000 will reset itself if the 'K' factor switch is left for more than 10 seconds.

3.2.5. 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 3.2.1 page 13. While setting this value, the price display will indicate ***'Sd'*** and the volume display will indicate ***'dXXXX'***

3.2.6. Pre-Set Cut-Off

Pre-set Cut-off is available from Software Version 26:01.0.

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 3.2.1 page 13. The Price display shows ***'PCut'*** and the volume display shows ***'PCX.XX'***. The range is from 0.01 to 9.99 litres.

3.2.7. 'b' Settings. Air Detection, End of Delivery Flag, and Price Per Litre Display

These two options are available from Software Version 27:02:0:

- configurable air detect;
- Flag preset end of delivery.

This option is available from Software Version 27:130:0:

- Change price decimal point position.

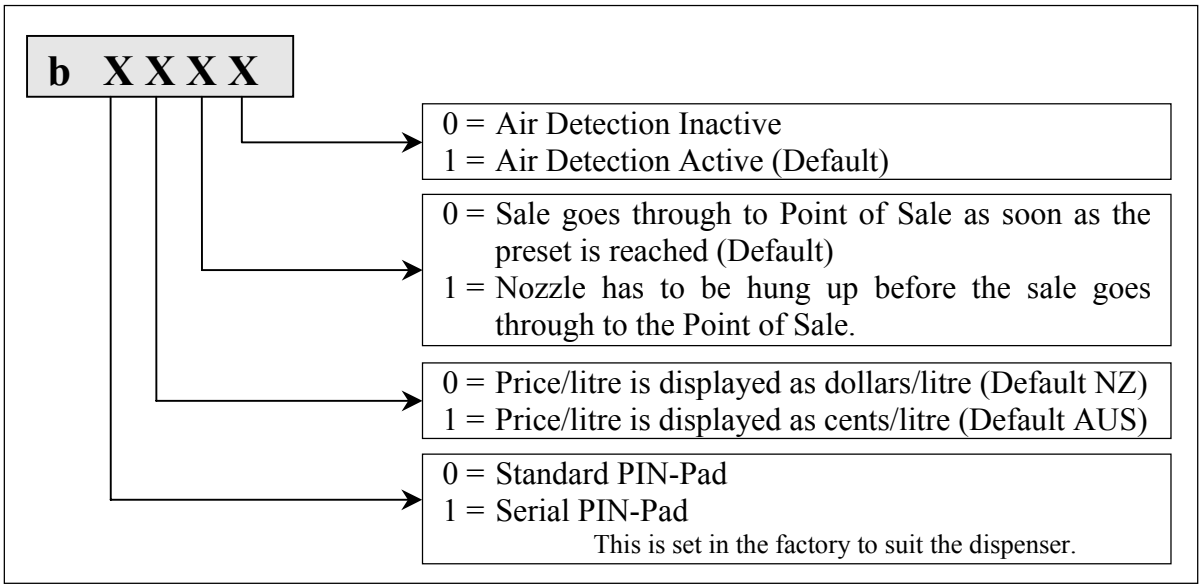


Figure 2. 'b' settings

Setting the 'b' settings

Refer to section 3.2.1 page 13. While setting the 'b' settings, the price display shows ***'b'*** and the volume display shows ***'bXXXX'***.

3.2.8. Configuration Code

Since version 17 of the C3000 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 18.

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.

   Note: Software version 27070 and previous do not support LPG correction and motor spirit non-correction, and require digit 4 for LPG and motor spirit 125 correction. This software should not be fitted if the unit has COM125 magnetic or Bennett flow meters.

Setting the Configuration Code

Refer to section 3.2.1 page 13. While setting the configuration code, the price display shows ***'C'*** and the volume display shows ***'XXXXX'***.

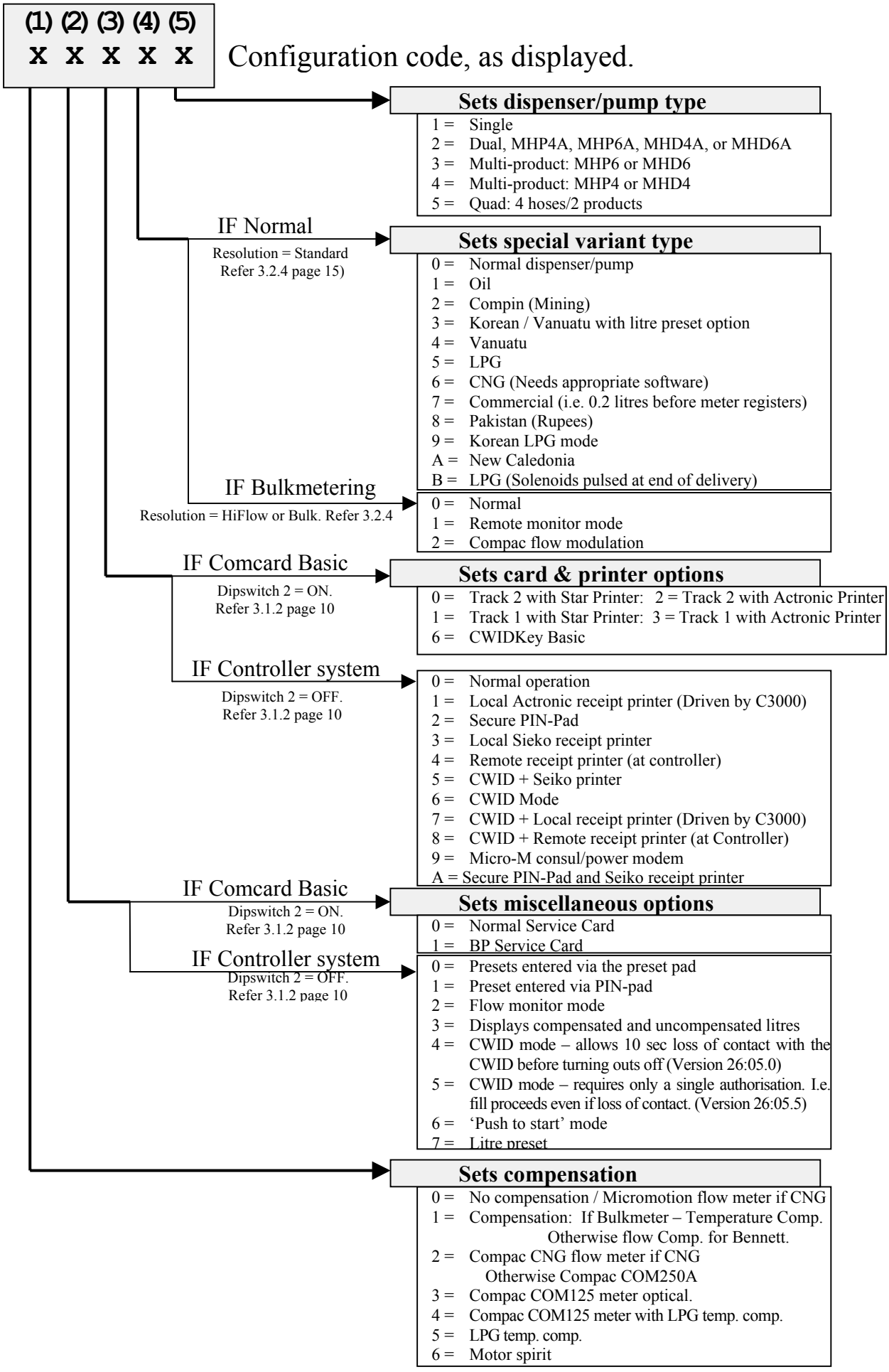


Figure 3. Configuration Code Options

3.3. 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 (need appropriate software)
- Specific Density ***'den'*** - LPG (need approriate software)
- Temperature***'E'***- LPG (with appropriate software) - Bulkmeter
- ACV Valve Flow rate ***'FLO'*** - Bulkmeter
- L Cut ***'L'*** - Bulkmeter
- H Cut***'H'*** - Bulkmeter
- F Cut ***'F'*** - Bulkmeter

Also for CNG, NOTE:

- With CNG, 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. ***'0.00').***

3.3.1. 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 C3000 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) dispensers, a Density Factor must be set for each hose.

Setting the Product Density Factor

Refer to section 3.2.1 page 13. While setting the Product density factor, the price display shows ***'dSF'*** (***'dFb'*** for side "B") and the volume display shows ***'X.XXXX'***.

3.3.2. Specific Density

This setting is only available for LPG and Bulkmeter modes

The specific density for LPG must be set to allow the C3000 to accurately meter the amount of LPG dispensed. The specific density of the product should be obtained from the LPG supplier, and must be entered in units of kg/m^3.

Setting Specific Density

Refer to section 3.2.1 page 13. While setting the Specific Density, the price display shows ***'dEn'*** and the volume display shows ***'XXX.X'***.

3.3.3. 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 3.2.8

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 ***'EXXX.X'*** to the known temperature value.

To check operation of the probe, press the 'K' factor switch to observe ***'EXXX.X'*** and 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 3.2.1 page 13. While setting the temperature, the price display shows ***'E'*** and the volume display shows ***'XX.X'***. The temperature is displayed in °Celcius.

3.3.4. 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 18)

Setting ACV Valve Flowrate

Refer to section 3.2.1 page 13. 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.

3.3.5. 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 ACV Valve Flowrate

Refer to section 3.2.1 page 13. While setting the “L-Cut”, the price display shows ***'LCUT'*** and the volume display shows ***'LXXXX'***.

3.3.6. 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 3.2.1 page 13. While setting the “H-Cut”, the price display shows ***'HCUT'*** and the volume display shows ***'HXXXX'***.

3.3.7. 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 3.2.1 page 13. While setting the "F-Cut", the price display shows ***'FCUT'*** and the volume display shows ***'FXXXX'***.

3.4. Parameter Switch

Refer to Figure 1 page 4 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, *'d'* (Bulkmeter Registers 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

3.4.1. 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.

3.4.2. Setting the Price per Litre

The C3000 processor board can be set for five hose configurations:

1. Single (e.g. one C3000 controls one hose)
2. Dual (e.g. one C3000 controls two hoses)
3. Multi (for Issue "L") - e.g. one C3000 controls two or three
4. Controls 4 hoses (Issue "M" only)
5. Quad (for Issue "M") - all hoses.

The flow charts below are to be used to set the price. For configurations 1 and 2, use the Figure 15 flow chart and for configurations 3, 4 & 5 use the Figure 16 flow chart (also reference the Note 1, which accompanies Figure 16).

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 C3000 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 '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 C3000 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 '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 C3000 will reset itself if the Parameter switch is left for more than 60 seconds.
Continue for each hose units		
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:

1. The Compac "All Hose" multi-product pumps and dispenser are configured as either 3 dual hose C3000s, or 1 quad and 1 dual hose C3000.
2. 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.
3. 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.

3.4.3. Setting the Product Density

Only available in Bulkmeter mode (when Sr = 0).

With Bulkmeter registers, the product density must be set. This can be done either at the Register (for 'stand-alone' C3000 Heads), or at the Central Controller for controller sites (in this case the density entered at the register must be zero to allow the 'controller set' density to override).

To set Product Density at the C3000, press and hold the Parameter switch until the message *'den XXX.X'* appears on the display. Then change this value using the usual press/hold/release method to obtain the desired density.

3.4.4. Setting the Dispenser/Pump Number

Depress Parameter switch nine (9) or more times and the message ***'Pn'*** will appear on the screen. The processor will then roll the display number until the switch is released. The value of the displayed number will then be stored as the pump/dispenser number.

3.4.5. Displaying the End of Sale Indications

Depress Parameter switch nine (9) or more times and a number will be displayed in the ***'Price Per Litre'***window. Refer to Section 10.1 for the description of the numerical indicator.

3.4.6. 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 ***'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.

3.4.7. Validating/Invalidating Cards, Pins, or Keys

This is only available on Comcard Basic, Compin Basic, or CWIDKey Basic systems.

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.

3.4.8. Setting the Access Code

This is only available on Comcard or CWIDKey Basic systems.

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. See also Scrolling Tote Option in Section 5.2 page 28.

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.

To access this option ***Operating Dipswitch 4*** must be ON. 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.

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 C3000 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 C3000 memory IC 'chip').
2. The displays are only capable of displaying five-digit whole litre totals (maximum of 99999), but the C3000 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 C3000 microprocessor PCB, via an interface PCB (CI62) which also provides the printer with a 12V power supply. The interface PCB provides 'opto-isolation' between the C3000 intrinsically safe circuitry and the 'unsafe' printer circuitry, for the printer driver signal.

This Receipt Printer option is only available for C3000 microprocessors controlling one hose pumps/dispensers, or for C3000s which are set-up in 'True Multi' configuration. A PINpad must also be connected to the C3000 and the **third** digit of the Configuration Code must be set to **'1'** or **'3'** (See Section 3.2.8)

- 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 C3000 intrinsically safe terminals at the *Auxiliary Plug (Pins 1, 6 & 8)* and to the *Nozzle Switch Plug (NOZZ 3 Pin)*. The other end of these wires connect to *Plug 1* on the Interface PCB (CI62).

The 230V-supply connection on the Interface PCB is at *Plug 3*.

Power and data connections to the printer and cutter are from *Plug 2* on the Interface PCB.

The 12V supply connects to *Plug J1* on the cutter and *Plug PL1* on the printer processor PCB. The data cabling connection at the printer is to Pins 2 & 3 of the printer seven pin data plug.

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 C3000 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 C3000 (detailed on the previous page). To select this option the third digit of the Configuration Code for the C3000 should be set to **'4'** or **'5'**, depending upon whether a standard or Secure PINpad is installed on the pump/dispenser. (See Section 3.2.8).

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

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

For COMCARD and CWIDKey systems to operate the '***Operating dipswitch***' two (2) must be switched ON. Note: The Configuration Digit "4" must not be set to two (2).

For the COMPIN system, the Configuration Digit "4" must be set to 2 and the ***'Operating dipswitch'*** two (2) must be OFF.

In this mode of operation the 'C3000 Head' operates as a totally self-contained system operating independently of central controller. The C3000 '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 3.4.7 and 3.4.8 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 10.3.5 page 44) 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 3.2.8 page 17) 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 10.3.6 page 44) 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 3.2.8 page 17) 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 C3000
Err 11	Invalid access code (Comcard or CWIDKey Basic systems only).	Enter valid access code.
Err 12	C3000 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 100litres/m.
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	*On PIN Pad Dot*	*Explanation (if required)*

Display	*Matrix Display (if Connected)*	
REPAS	Pass Again	Card not read properly, try re-swiping. In addition, C3000 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.
: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 cutout switch has operated. (Software Version 25:02.0 and later)
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

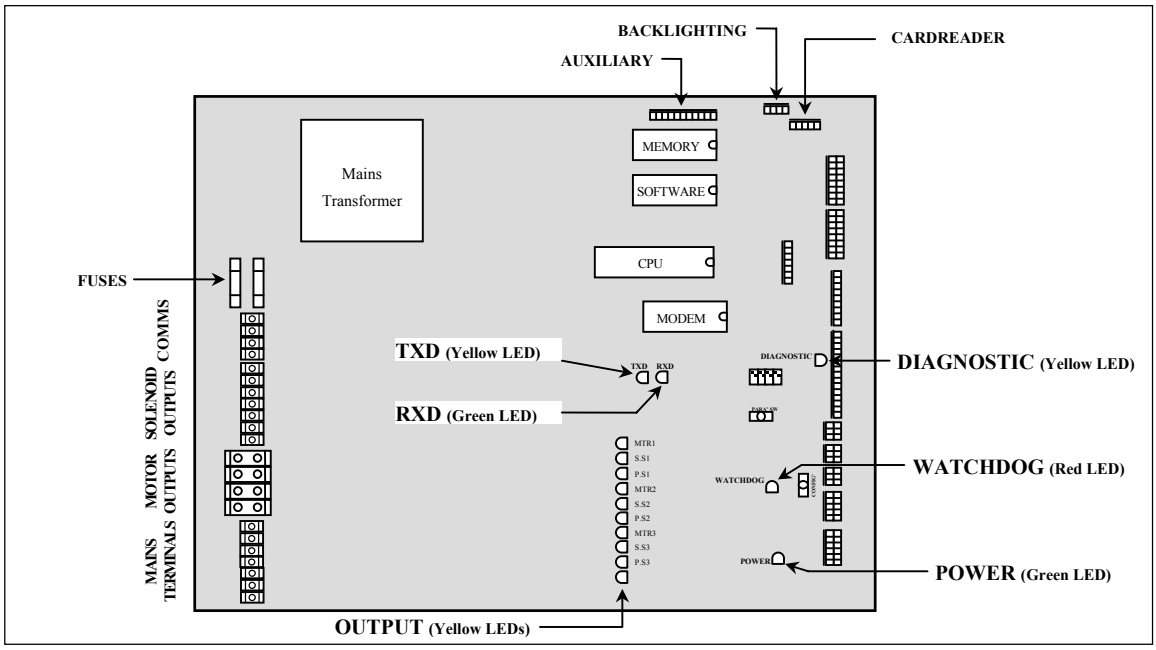


Figure 5. Location of LEDs

8.1. General

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

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

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

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

The ten **Output** LEDs light to indicate their respective output should be energised.

The **TXD** and **RXD** LEDs indicate polling of communications to/from a controller. The RXD LED flashes whenever any communications polling is received and the TXD LED flashes whenever the C3000 processor responds to polls for its respective pump number(s).

9. SOLID STATE RELAYS (TRIACS)

9.1. General

The solid state relay, as the name implies, is a solid state switch, controlled by the C3000. These solid-state switches control the C3000 230-volt outputs.

NOTE:

A leakage current of 4 to 6 mA can sometimes cause problems when the outputs are used to control high impedance loads such as control relays, small contactors, and small solenoid coils. Therefore, it is recommended that in such situations, a 22KΩ, 5W resistor shall be wired between the output and neutral.

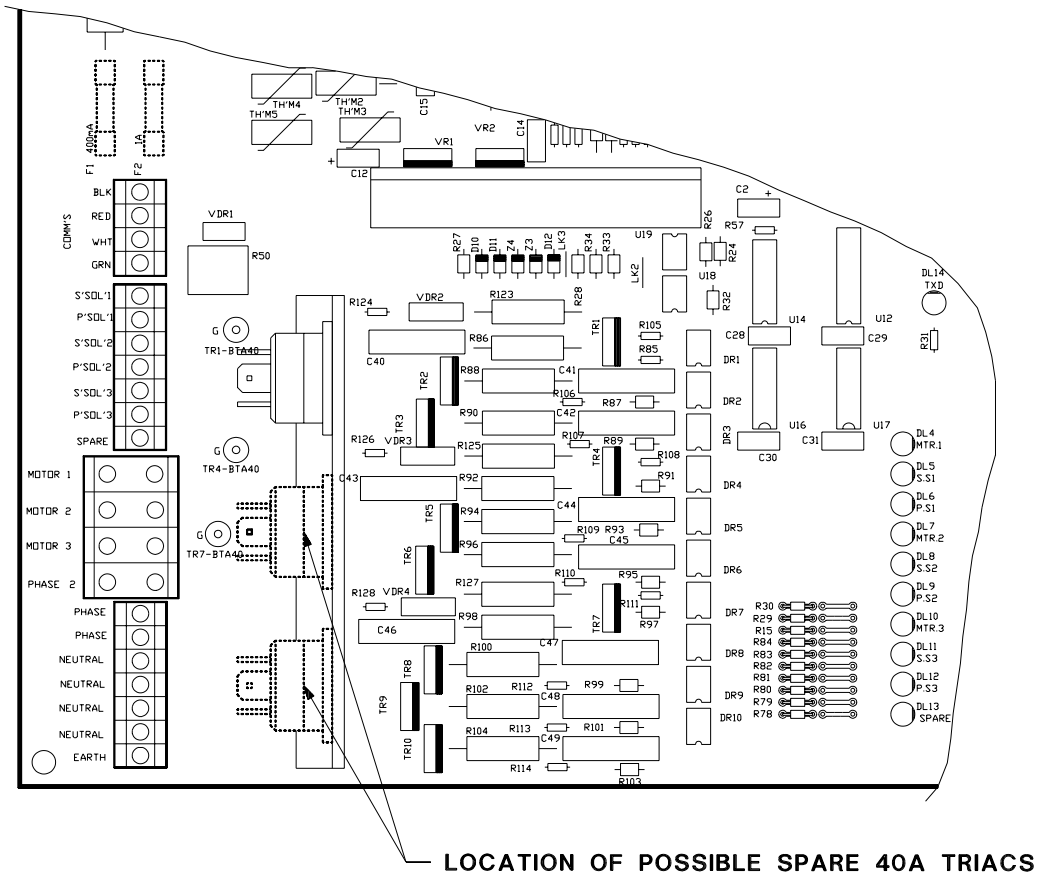


Figure 6. Location of Solid State Relays (Triacs)

There are 10 separate solid state relays (small triacs) on the C3000 PCB. Their function varies depending on what the C3000 'head' is controlling.

Name	Function			High / Low Current Output
	Single	Dual	MHD/MHP	
MTR1	Electric Motor Control	Electric Motor Control	Electric Motor Control	High (40 A max) or (Low 300mA max)
S.S 1	Secondary Solenoid Coil Control	Secondary Solenoid Coil Control	Secondary Solenoid Coil Control	Low (300 mA max)
P.S1	Primary Solenoid Coil Control	Primary Solenoid Coil Control	Primary Solenoid Coil Control	Low (300 mA max)

MTR2	Spare	Electric Motor Control	Electric Motor Control	High (40 A max) or Low (300 mA max)
S.S2	Spare	Secondary Solenoid Coil Control	Secondary Solenoid Coil Control	Low (300 mA max)
P.S2	Spare	Primary Solenoid Coil control	Primary Solenoid Coil Control	Low (300 mA max)
MTR3	* High flow Solenoid - Method 2 (see section 8.2.12) * Low flow Solenoid - Method 3 (see section 8.2.12) + Oil Air Bleed Solenoid	* High flow Solenoid side 'A' - Method 2 (see section 8.2.12) * Low flow Solenoid side 'A' - Method 3 (see section 8.2.12) + Oil Air Bleed Solenoid side 'A'	Electric Motor Control	High (40 A max) or Low (300 mA max)
S.S3	Spare	Spare	Secondary Solenoid Coil Control	Low (300 mA max)
P.S3	Spare	* High flow Solenoid side 'B' - Method 1 * Low flow Solenoid side 'B' - Method 2 + Oil Air Bleed Solenoid side 'B'	Primary Solenoid Coil Control	Low (300 mA max)
SPARE	Spare	Spare	Spare	Spare low current

* Only when High/Low flow switch is fitted.

+ Only when Oil float switch fitted

	Function			**High / Low**
Name	**LPG**	**CNG**	**Bulk Meter**	**Current output**
MTR1	Electric Motor Control	Low A	Motor	Low (300 mA max)
S.S 1	Secondary Solenoid Coil Control	Spare	Low Flow New Compac OCV Control N/C Solenoid	Low (300 mA max)
P.S1	Primary Solenoid Coil Control	Med 1A	High Flow New Compac OCV Control N/C Solenoid	Low (300 mA max)
MTR2	Spare	High A	Tank Valve Signal	Low (300 mA max)
S.S2	Spare	Spare	Spare	Low (300 mA max)
P.S2	Spare	Low B	Caltex	Low (300 mA max)
MTR3	Spare	Med 1B	Mobil	Low (300 mA max)
S.S3	Spare	Spare	Shell	Low (300 mA max)
P.S3	Spare	High B	BP	Low (300 mA max)
SPARE	Excess flow output - Turned on if flow rate exceeds 100litres/m. Stays on until dispenser turned off. Supported in version 24.002 and beyond.	Auxiliary Output for CNG Compressor Control	Additive Pulse	Low (300 mA max)

Caution: MTR1, MTR2, & MTR3 are sometimes not complete high current relays, refer to the following section in this manual on changing high current relays.

9.2. Changing Solid State Relays

As can be seen, there are more relays on the C3000 PCB than are normally required. This means that there are often spare relays available for use if a relay fault occurs.

As there are two types of relays, it is important that the correct relay type is maintained when changing from one relay to another.

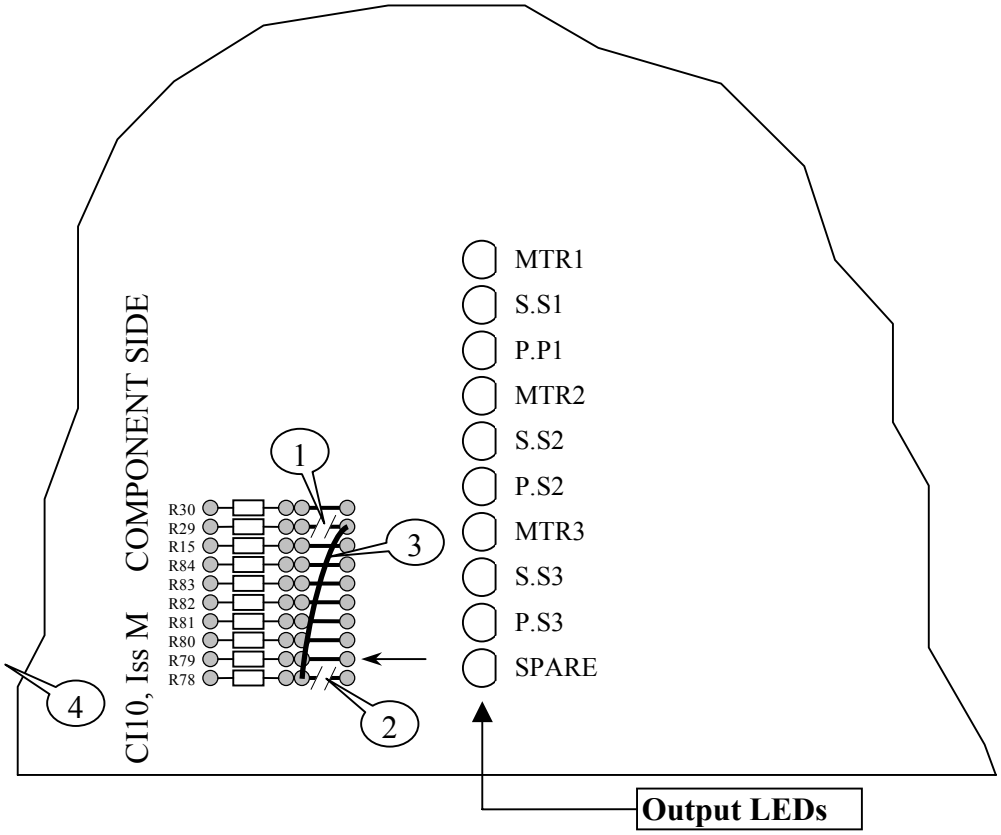


Figure 7. Triac Output Link Changeover

9.2.1. Low Current to Low Current Relay

Small Triac to Small Triac

Changing from a faulty low current relay to a spare low current relay involves four steps. Before changing relays, check the faultfinding section in this manual.

1. **Step One**

   There are 10 tracks on the C3000 PCB, one track for each solid state relay. These tracks are part of the circuitry connecting the CPU to the solid state relays. Isolate the faulty relay from the CPU by cutting the appropriate track between the two solder vias, being careful not to damage any other tracks.

2. **Step Two**

   Select the spare solid state relay track to be used, cut its track as above.

3. **Step Three**

   Solder the short piece of 24 gauge insulated wire diagonally from the solder via on the CPU side of the faulty relay to the solder via on the solid state relay side of the replacement relay.

4. **Step Four**

   Finally, connect the device that was connected to the faulty relay output terminal to the spare relay output terminal.

9.2.2. High Current to High Current Relay

Depending upon which C3000 'Head' is installed, there can be two, one or no spare high

current relays. Sometimes the spare high current relay(s) are complete. If possible, select a complete relay. If this is not possible, try to establish which of the following faults has occurred. It may not be possible to determine exactly, which fault has occurred, in which case assume that the triac circuitry is faulty and repair accordingly. If this does not resolve the problem then replace the motor triac.

Fault - Faulty Motor Triac.

Remedy - Replace the triac with another SGS Thomson BTA40-600B triac. The triac is mounted on the heatsink using two machine screws and has three spade terminals for electrical connection. The triac terminal layout for Issue L C3000's is as below:

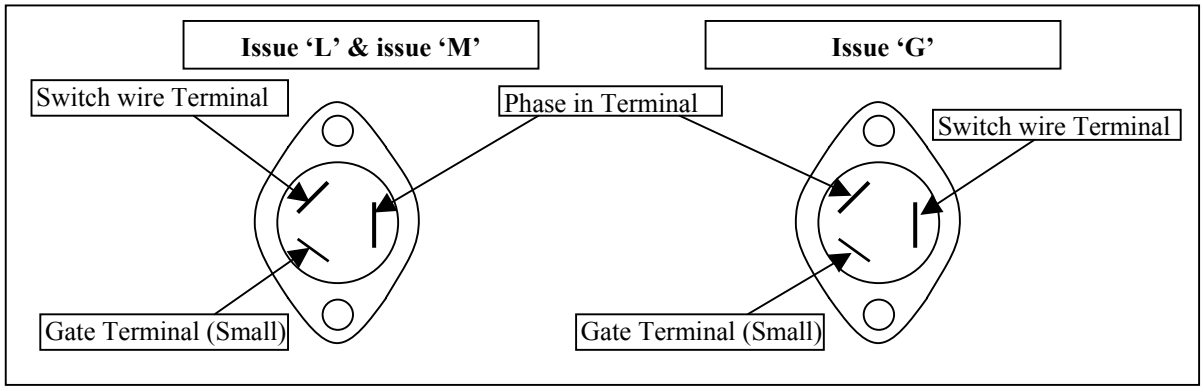


Figure 8. Motor Triac Layout

Fault - Faulty Control Circuitry of Motor Triac.

Remedy - Select a spare motor-triac circuit following the steps below, refer to the drawing on the previous page to assist with steps One to Three.

> **NOTE: -** Only outputs 1, 4 and 7 (MOTOR 1, MOTOR 2 and MOTOR 3 respectively) have the available circuitry to drive a 40A motor triac.

1. **Step One**

Isolate the faulty relay from the CPU side by cutting the appropriate track between the two solder vias, being careful not to damage any other tracks.

2. **Step Two**

Select the spare solid state relay track to be used and cut as above.

3. **Step Three**

Solder the short piece of 24 gauge insulated wire diagonally from the solder via on the CPU side of the faulty relay to the solder via on the solid state relay side of the replacement relay.

4. **Step Four**

Solder the motor triac gate wire into its new respective gate via (terminal) on the C3000.

5. **Step Five**

Connect the motor triac 'switch-wire' into its new respective output terminal.

6. **Step Six**

Finally, connect the phase wire, from the motor, into the new output terminal.

10. ELECTRICAL WIRING

10.1. 230 Volt Wiring

Power for the C3000 'head' connects to the terminals marked *Phase 2, Neutral, & the Earth Stud.*

On board the C3000 Microprocessor the incoming phase feeds the microprocessor power supply through the fuse ***F1 (250mA)*** and feeds all low current solid state relay circuits through the fuse ***F2 (1A)*** and resistor ***R50***. R50 is a 7W 8.2Ω resistor.

Solenoids and motors are connected to the appropriately marked terminals.

With dispensing units, the 'switch wire' for the remote (submersible) pump is taken from the respective Motor Output terminal. A 22kΩ, 5W resistor must be wired between this output and neutral. This is to ensure the triac output circuitry has sufficient load on it to correctly operate the control circuit relay/contactor connected. Similar precautions must be taken with any high impedance load to be connected.

It is recommended **not** to use these solid state relay outputs as direct inputs (feeds) to electronic control devices, e.g. Timers PLC's.

10.2. Communications (Comms) Wiring

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

* FUTRA communications use all four comms terminals. For more information, see the C3000 Manual FUTRA supplement.

The C3000 can communicate with the following Forecourt Controllers:

- Micro M
- Eftpec
- Compac Central Controller
- Task
- Postec
- Compac Commander

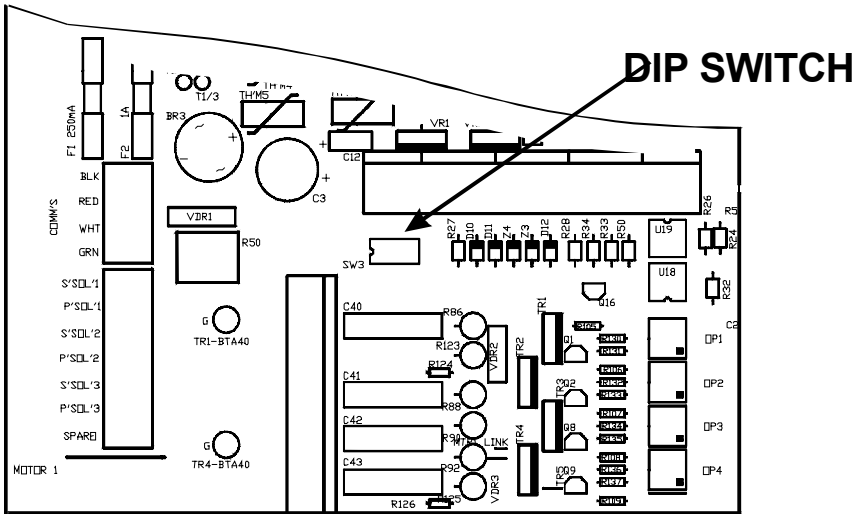


Figure 9. Location of Comms Dipswitches On C3000 issue 'P'

From C3000 Issue P a DIPswitch replaces the links that were on Issue M and all earlier boards.

Comms DIP Switch settings:

- With LX400 Printer :
  - Switch 3 Off (Open)
  - Switches 1,2,4 On (Closed)
- With LX300 Printer or computer:
  - Switches 1,2,3,4 Off (Open)
- Current Loop Comms (Standard)
  - Switch 4 Off (Open)
  - Switches 1,2,3 On (Closed)
- With Gilbarco consul interface
  - Switch 2,3 Off(Open)
  - Switch 1,4 On(Closed)

NOTE: An appendix to this manual gives information on the links on earlier board issues.

10.2.1. C3000 Gilbarco Protocol Converter

An interface board (CI147) plus any software version DIG29007 onwards (or DIU29007 for USA Gilbarco protocol) is required if the C3000 is to connect to any Gilbarco Consul. This only works on issue 'P' C3000 boards.

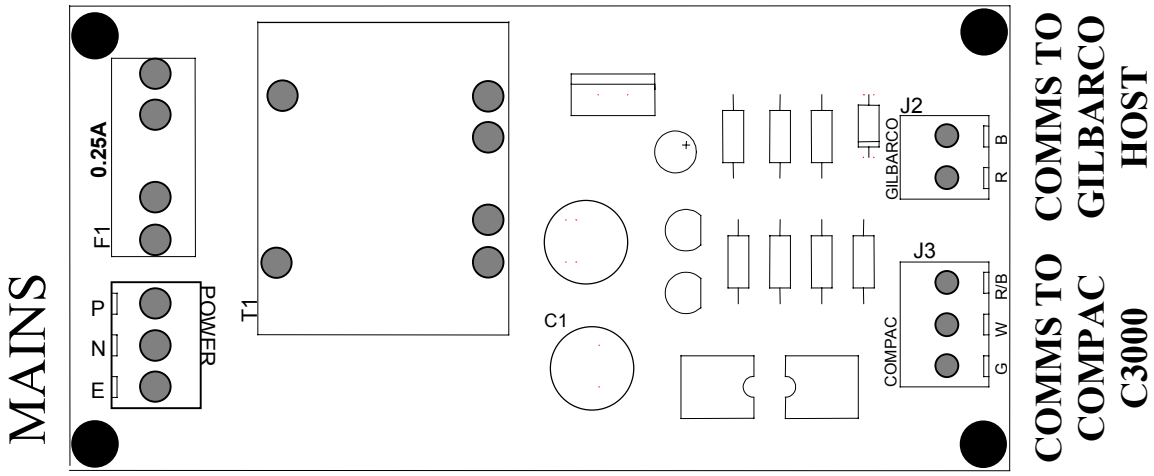


Figure 10. C3000 Gilbarco Protocol Converter

The Comms dipswitch settings (See Figure 9) must be set with switches 1 & 4 ON and switches 2 & 3 OFF.

The interface board, shown in Figure 10, may be located at the dispenser or at the switchboard.

A three core cable is required to connect the interface board to the C3000. The red and black terminals on the C3000 must be connected together and the cable should be connected to the terminals labelled Green, White, and Red/Black.

Although a single interface board can connect multiple C3000's it is recommended that separate boards be fitted for each pump to enable the communications circuits for individual pumps to be isolated (for diagnostic purposes) via the Gilbarco blue box.

The mains power supply to this interface board should be taken from the dispensers supply so that when the dispensers mains supply is switched off then the mains supply for this board should also be removed. This ensures complete electrical isolation of the pump.

10.3. Intrinsically Safe Wiring

The following input and output devices connect to the C3000 microprocessor board at the terminals labelled below.

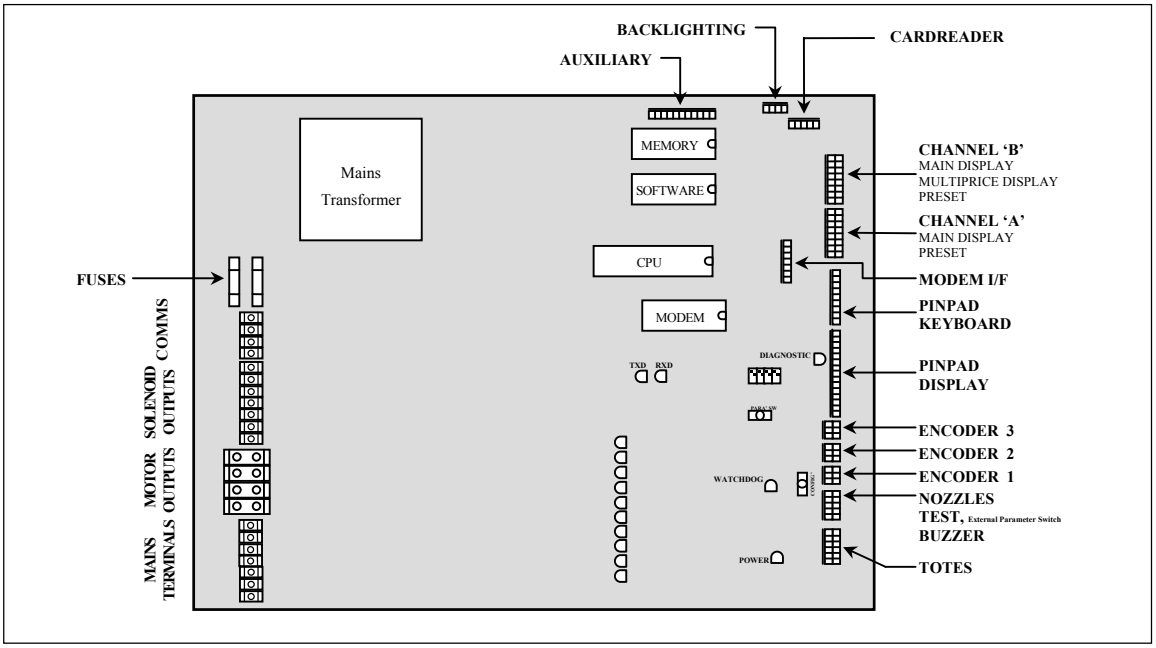


Figure 11. Location of the intrinsically safe terminals

10.3.1. Diesel Air Cut-out Switch

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 C3000'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.

The two (2) core cable from the air pressure switch terminates on pins 2 & 8 of the *'Auxiliary'* plug on the C3000 PCB. For two hose pumps, use pins 2 & 8 for Side A and pins 1 & 8 for side B.

NOTES:

1. (From Version XX-X-26:06.0 software): If air is detected during a transaction and the solenoid delay is set to zero, the flow solenoids are turned off but the transaction is not terminated unless the condition lasts longer than 30 seconds. The flow solenoids are turned back on as soon as the air is not detected. If the solenoid delay is not zero then the cutout works as described above.
2. (FUTRA or Central Controller): For pumps with a Secure PIN pad and a Diesel Air Cutout Switch. The *'Diesel Air Cut-out Switch'* two core cable connects between '0V' and 'R0' of the nine (9) pin *'Keyboard'* plug on the C3000. Secure PIN pads are only available on single hose pumps.
3. For pumps with a CWIT reader, the air cutout cable connects between 'B1' of' *Encoder 2'* and ' 0V'. CWITs are only an option on single hose pumps.
4. For connections to a 3-product MPD, Pin 1 of the auxiliary plug connects to Pump 2, Pin 2 is for Pump 3 and R2 is for Pump 1. On multi-product pumps with mulit-price displays (Issue "L" only), there is a 8-core cable which runs from the two C3000 heads through the vapour barrier (via a gland to a four-way plug). Two core fly leads run from the plug to the air cut-out switch on each pump. Wiring is as per drawing shown below:

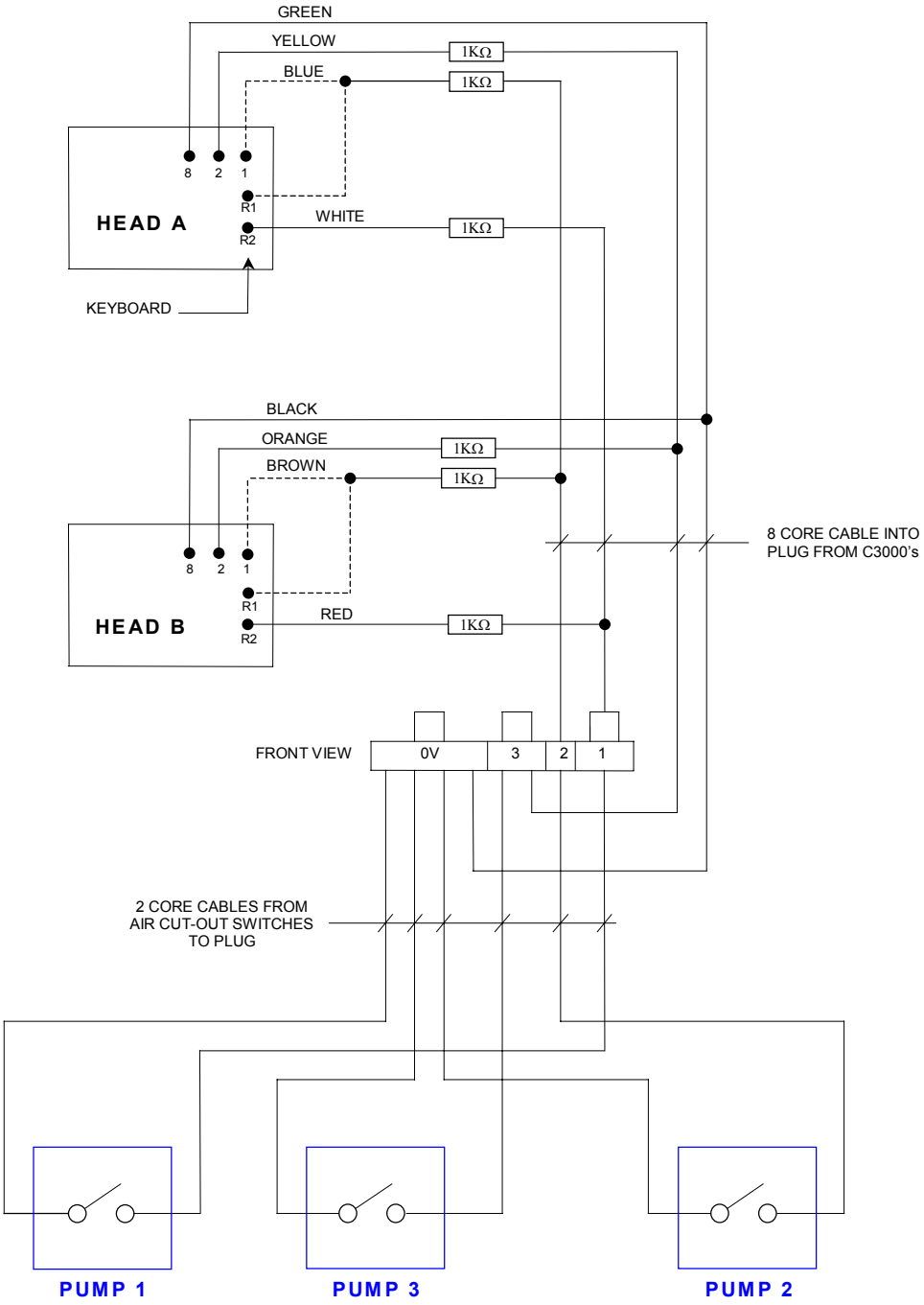


Figure 12. Air Cutout Circuit Diagram (for true multi)

5. For connections to a Quad or 2-product MPD, then Pins 1 and 2 of the auxiliary plug connect to Pump 2 (hoses 2 & 4) and Pump 1 (hoses 1 &3), respectively.

10.3.2. Sump Switch (Issue "M" only)

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 supported on the P25 software version and is wired into the KINA input of the dispaly connector.

10.3.3. Temperature Compensation PCB

The PCB is 'piggybacked' on the C3000 PCB above the memory and software I.C. chips.

There are two (2) different types of temperature compensation PCB's: 1) Old type 2) New type. Both are depicted as follows in the diagrams below:

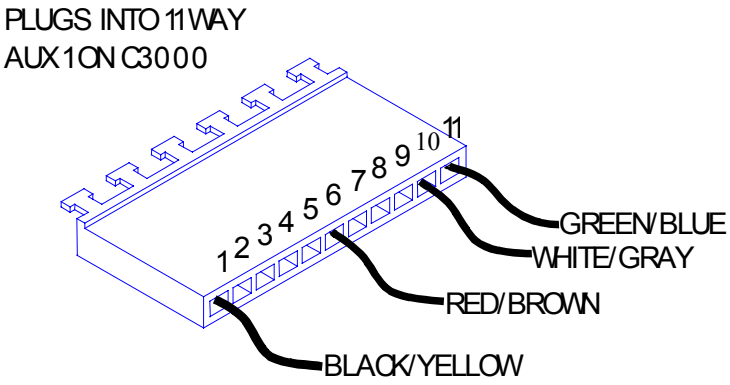


Figure 13. Old Type (11 Pin)

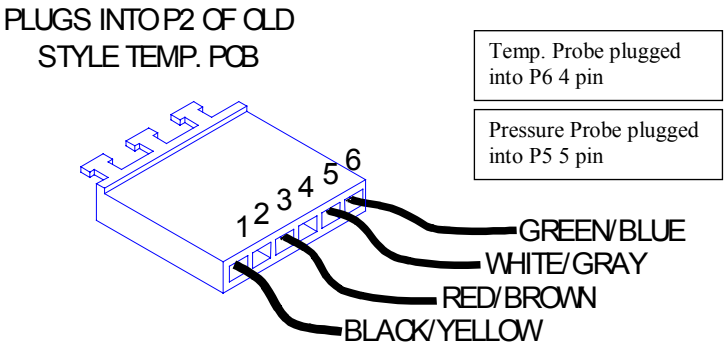


Figure 14. Old Type (6 Pin)

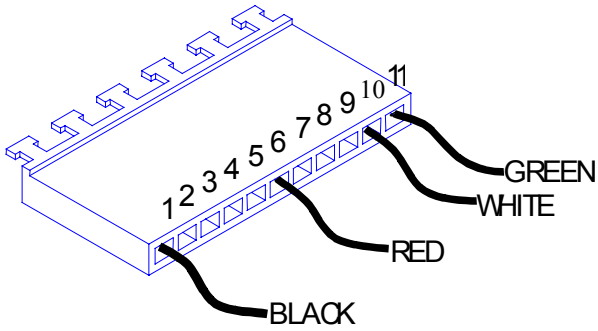


Figure 15. New Type (11-Pin)

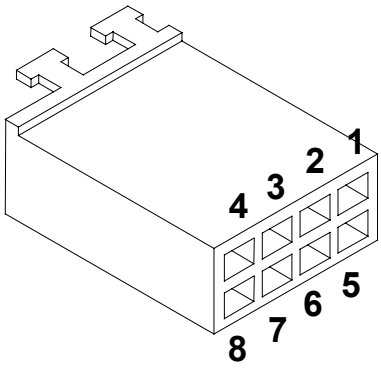


Figure 16. New Type (8-Pin)

10.3.4. 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 C3000 *'Backlighting'* plug (12V & 0V intrinsically safe terminals).

'12V & 0V' terminals are also available on the top four pins of the *'Tote'* plug on the *'Commercial Pump/Dispenser Distribution PCB'*.

10.3.5. Card-readers

The C3000 can have a *'Track 1'* or *'Track 2'* type card-reader connected to it. The 'track' number indicates the track on the magnetic strip of the card which will be read.

'Track 1' card-readers use an adapted Omron 3S4YR-HSR 3 (5V) card-reader and a light **blue** ribbon cable to connect to the C3000 *'Cardreader'* plug.

'Track 2' card-readers use an adapted Omron 3S4YR-HSR 4 (5V) card-reader and a light **grey** ribbon cable to connect to the C3000 *'Cardreader'* plug.

> **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.

10.3.6. Compac Wireless Transceiver

The CWIT PCB is mounted over the C3000 PCB and connected to the cardreader and auxiliary pinheaders as follows:

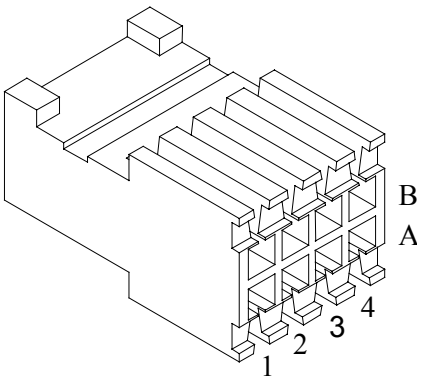


Figure 17. The CWIT cable end

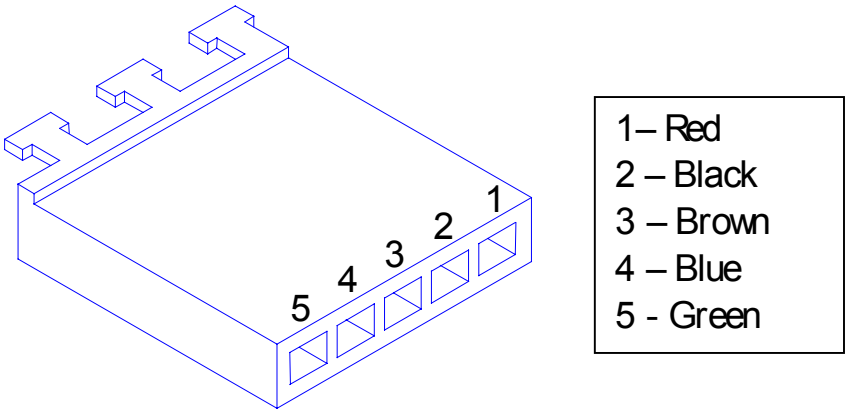


Figure 18. The C3000 (cardreader connector) end

The CWID RX line is connected to the TOTE 3 output on the C3000.

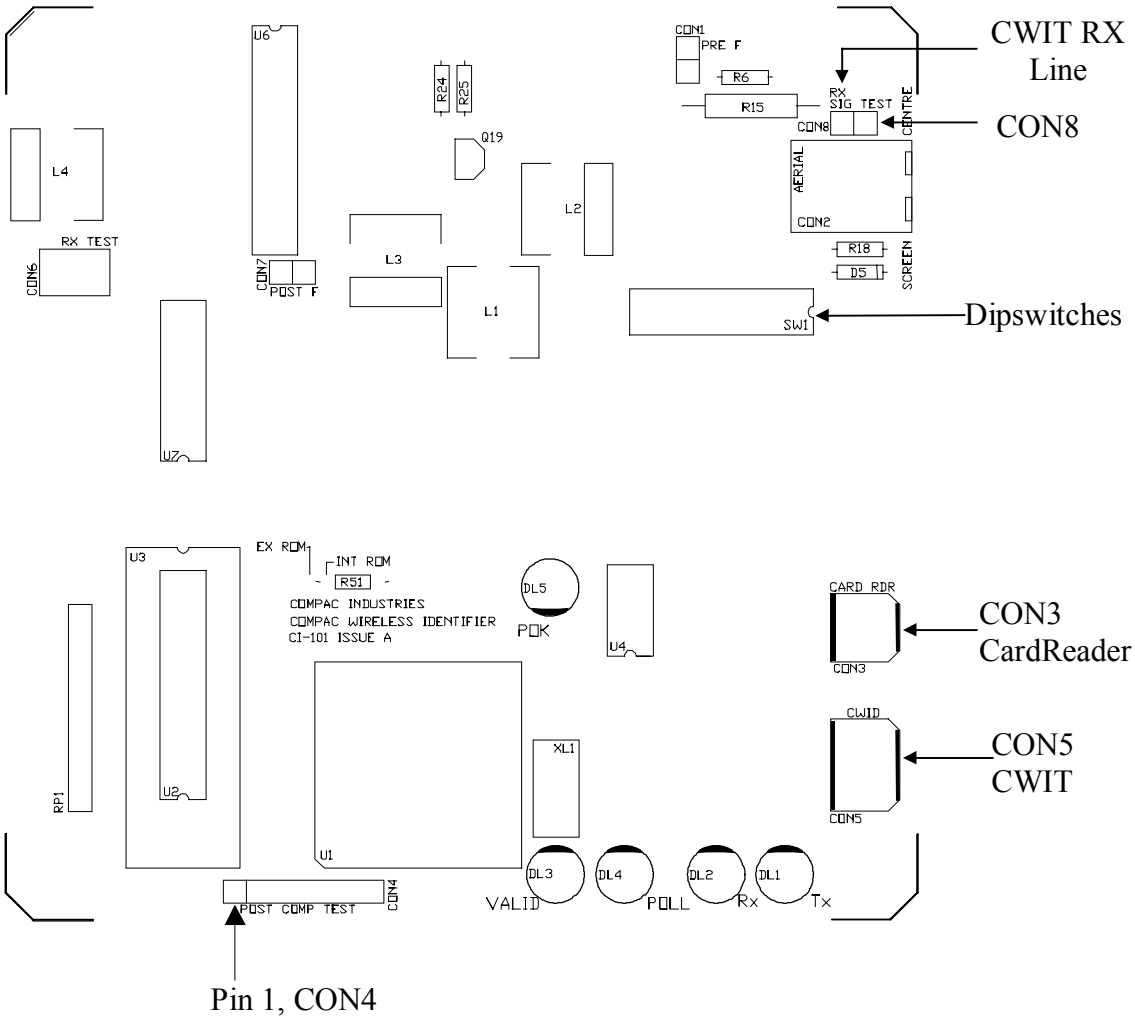


Figure 19. CWIT PCB

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, adjust the capacitance to obtain the maximum voltage at CON8. Each dipswitch adds a capacitor to the tuned circuit. The capacitance values being:

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

Dipswitch	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.

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

The latest types of displays plug into the eight-core display bus system, which has two channels: A & B.

Channel A

- Displays & Presets for single hose dispensers/pumps;
- Displays & Presets for side 'A' of dual or two hose pumps/dispensers, including side 'A' of MHD4A, MHD6A, MHP4A & MHP6A pumps/dispensers ('all hoses in use' versions);
- Dollars, litres & price display & Preset of MHD4, MHD6, MHP4 & MHP6 pumps/dispensers ('true multi' versions)

Channel B

- Displays & Presets for side 'B' of dual or two hose pumps/dispensers, including side 'B' of MHD4A, MHD6A, MHP4A & MHP6A pumps/dispensers ('all hoses in use' versions);
- Multi-price displays of MHD4, MHD6, MHP4 & MHP6 pumps/dispensers ('true multi' versions)

10.3.8. Modem

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

10.3.9. Standard PIN Pad Unit

This device consists of two parts:

Dot Matrix Display

This is a two-row display, which shows:

- Commands, e.g. 'Pass Card' or 'Take Fuel'
- Prompts for data entry, e.g. 'Load Odom and Push Enter' or 'Load Pin and Push Enter'
- Diagnostic messages, e.g. 'Invalid Card' or 'Wrong System'

This dot matrix now incorporates 12Vdc backlighting and requires a 12Vdc supply.

CAUTION:

1. Earlier versions of C3000's did not have a 12Vdc supply.
2. Earlier pinpads used 5V backlighting.

PINpad keypad

This is the board containing the push buttons for entering numbers when prompted to authorise the pump.

10.3.10. Secure PIN Pad Unit

This sealed non-serviceable unit contains a processor PCB and a tamperproof switch mechanism. The PIN pad plugs into the Distribution PCB (CI36 Iss. E)* at the five pin *'Secure PIN pad'* plug. These five cores carry the 0V, 5V, 12V, TX & RX signals. The 5V & 0V feed the dot matrix display backlighting, while the 12V & 0V feed the PIN pad processor PCB.

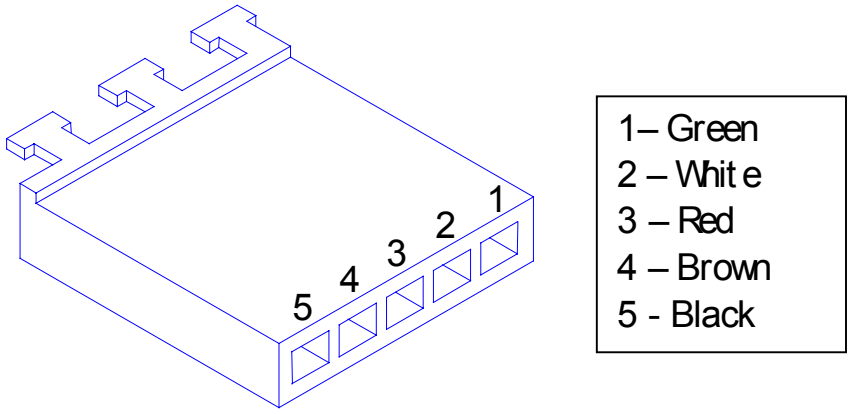


Figure 20. Secure PIN-pad connector.

To make the Secure PIN pad operational, the C3000 must be configured for secure PIN pad operation which involves setting the K Factor switch configuration code digit 3 to either '2' or '3'.

The Secure PIN pad has two error messages for internal faults:

- Low Battery
- Memory Error

The Secure PIN pad will display all messages and accept information normally displayed by and loaded via the standard PIN pad, except it does not accommodate entering of presets.

* PCB 'CI36, Iss E' has circuitry to drive the Secure PIN pad and so this PIN pad can not plug directly into the C3000.

NOTES:

1. See the special mention in the Diesel Air Cutout Switch section.
2. A secure pinpad has a 5-core cable. A standard pinpad has a 24-core cable.

10.3.11. 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 (1) rotation	=	0.47 litre
150 pulses	=	0.47 litre
One (1) pulse	=	3.1 ml

When the C3000 '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 C3000 will not start the pump and it will display an *'Er 9'* message.

The encoder connects to the C3000 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	MHD's & MHP's
ENC 1	Encoder from meter	Encoder from side 'A' meter	Encoder from product '1'
ENC 2	Not used	Encoder from side 'B' meter	Encoder from product '2'
ENC 3	Not used / High-Low / Oil	Not used / High-Low / Oil	Encoder from product '3'

10.3.12. 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.

10.3.13. 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 C3000 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 the *'Encoder 3'* terminals B1 & 0V of a single pump/dispenser or side A of a dual. If the unit is a dual with high/low flow on both sides, then side B's flow selector switch connects to the *'Encoder 3'* terminals B2 & 5V.

By closing the contacts on the flow selector switch of Side A the *'Encoder 3'* inputs are activated which in turn causes the MOTOR 3 output terminal to energise. For Side B the PS3 output terminal is energised. In Method 1 the 38mmNB Solenoid is wired to the MOTOR 3 output and the flow-selector switch is 'closed' in the high flow position. In Method 2 the 18mmNB Solenoid is wired to the MOTOR 3 output and the flow-selector switch is 'closed' in the low flow position.

10.3.14. Oil Air Bleed Switch

The Compac Oil pump/dispenser is fitted with an air eliminator. This comprises of a settling vessel where, air entrained in the oil can escape and collect at the top of the vessel where a float switch is mounted. This float switch controls a solenoid (via the C3000) which allows the air to vent from the top of the settling vessel to the atmosphere.

When emersed in oil, the float switch is up and its contacts are open. As air accumulates, the float drops, closing its switch contacts that input to the C3000. The C3000 then turns on an output that opens a solenoid to vent the air to atmosphere. This causes the oil level to rise again deactivating the float switch and so shutting the solenoid valve. This air elimination process is automatic.

The two core cable from the 'oil air bleed switch' on single pumps or side A of two pump units, connects to terminals B1 & 0V of the *'Encoder 3'* plug. The two core cable from the 'oil air bleed switch' on side B of two pump units, connects to terminals B2 & 5V of the *'Encoder 3'* plug.

NOTES:

1. For connections to a 3-product MPD, Pin 1 of the auxiliary plug connects to Pump 2, Pin 2 is for Pump 3 and R2 is for Pump 1.
2. For connections to a Quad or 2-product MPD, then Pins 1 and 2 of the auxiliary plug connect to Pump 2 (hoses 2 & 4) and Pump 1 (hoses 1 &3), respectively.

The solenoid valve is wired to the MOTOR 3 Output terminal for single pumps and for side ‘A’ of two pump units. The solenoid on side B of two pump units is wired to the PS3 Output terminal.

10.3.15. Nozzle switch(es)

The nozzle switch leads plug in between *Nozzles 1*, *2* & *3* and *0V*. When the nozzle is lifted, the nozzles switch closes and the C3000 initiates a transaction.

Note: Diagnostic LED (*DL1)* will flash rapidly when any nozzle is lifted regardless of hose configuration.

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 SPARE to be energised. The SPARE output can then be used to disable the CNG Compressor if so desired.

10.3.17. Remote Parameter Switch

(With or without a buzzer).

The remote parameter switch cable plugs into the C3000 between the *Test* and *0V* terminals. The switch type is *'normally open'*. If installed, the buzzer leads plug into the C3000 between the *Buzz* and *5V* terminals.

10.3.18. Electromechanical Totalisers

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

10.3.19. Electronic Totals

As well as having electromechanical totalisers for litres dispensed from the pump, each C3000 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 an 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.

10.3.20. Distribution Boards

In several types of pumps/dispensers, distribution boards are fitted to allow intrinsically safe connections to be made without having to gland several cables through the vapour barrier. As far as possible, the plug configurations on the distribution boards are the same as on the C3000 PCB. Where this has not been possible, all connections are clearly labelled.

10.4. Mains (220/240Vac) Wiring

10.4.1. Pumps/Dispensers without Junction Box

Where a pump/dispenser has no junction box then it is designed to have the incoming mains cable and communications cable connected directly to the screw terminals on the C3000 printed circuit board (PCB). In this case the incoming cables must be glanded through the vapour barrier using vapour tight glands. The mains cable is to connect to the "phase" and "neutral" terminals on the PCB. The earth is to be connected to the earth stud provided. The communications cable is to connect to Comms terminals (normally "Red" and "Blk") (see Figure 6 page 35).

10.4.2. Pumps/Dispensers with Junction Box. (Non LPG or CNG dispensers)

Where a flameproof junction box is provided the C3000 has been wired to a strip connector inside this box. The incoming mains and communications cables are to be glanded into this box using appropriate "Ex d" glands. The mains cable is to be connected to the phase and neutral terminals with the earth being connected to the stud provided. The communications cable is to connect to Comms terminals (normally "Red" and "Blk") see Figure 21 below.

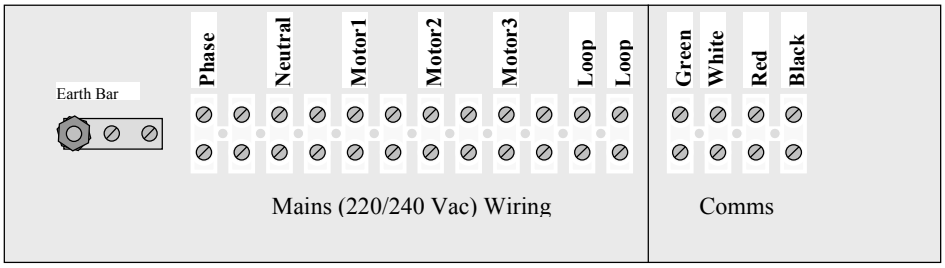


Figure 21 Junction Box Terminations

10.4.3. LPG & CNG Dispensers

For Class 1 Zone 1 pumps/dispensers all C3000 230V terminals, components, etc are encapsulated in an approved epoxy resin. These terminals are wired remotely to termination PCB's, housed in approved flame-proof enclosures, using three (3), four (4) or five (5) core *Olex cable* (Refer to the following tables).

These termination-PCBs duplicate all necessary C3000 terminals, fuses, and motor triac circuitry. All terminals are clearly labelled with the same names as the C3000 PCB.

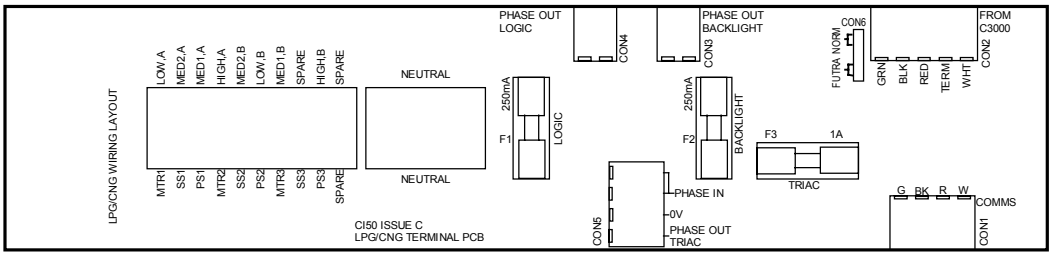


Figure 22. Termination PCB.

3 x 5 Core Olex Cables - Connection Details

C3000 Function	Colour	Cable Number
Phase Logic	Red	1.00
Neutral	Black	1.00
Comm's	White	1.00
Earth	Green	1.00
Comm's	Blue	1.00
MTR2	Red	2.00
Phase Triac	Black	2.00
PS1	White	2.00
SS2	Green	2.00
MTR1	Blue	2.00
SS1	Red	3.00
PS2	Black	3.00
PS3	White	3.00
SS3	Green	3.00
MTR3	Blue	300

4 x 5 Core Olex Cables - Connection Details

C3000 Function	Colour	Cable Number
Comm's	Red	C
Comm's	Black	C
Comm's	White	C
Comm's	Green	C
Comm's Futra Link	Blue	C
Phase Logic	Red	1.00
Neutral	Black	1.00
Spare	White	1.00
Earth	Green	1.00
Not Used	Blue	1.00
MTR2	Red	2.00
Phase Triac	Black	2.00
PS1	White	2.00
SS2	Green	2.00
MTR1	Blue	2.00
SS1	Red	3.00
PS2	Black	3.00
PS3	White	3.00
SS3	Green	3.00
MTR3	Blue	3.00

10.5. Software Upgrade Procedure

This is the software upgrade procedure to be followed for all bulk meter registers and all pumps with a C3000 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 C3000 Processor Board and record all set-up data by accessing the configuration (K-Factor) switch and the parameter switch, this includes recording the operating and comms dipswitch settings. Data set-up to include:
   - K factor 'F ' (all but CNG)

- No flow delay 'n'
- Pre-set cut-off margin 'PCut'
- 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 '
- 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)

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 28).

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

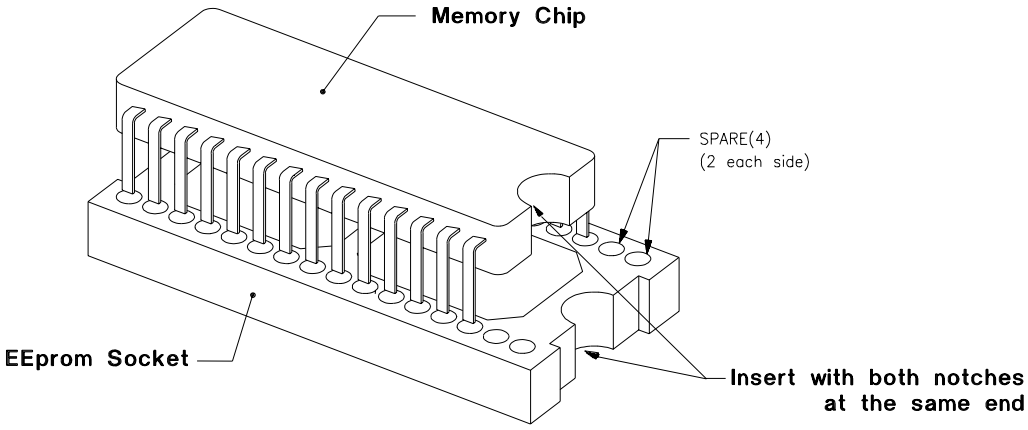
5. Turn off power.
6. Remove software EPROM (removable chip labelled C3000 PXX or XX-X-XX:XX.X) using an EPROM extractor.
7. Plug in new software EPROM, being careful that the dimple is at the correct end of the socket. (i.e. software chip dimple to base dimple). Also that all the legs are correctly 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 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.



NOTE: The 256K chips are to become obsolete. The 512K chips are being used in their place and CK1 is permanently linked.

11. FAULT FINDING

Symptom	Action
Watchdog LED is on	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 C3000* *If watchdog resets (i.e. stays off), then everything is okay.* *Replace C3000 PCB if watchdog still comes on after re-power.* No - *Replace C3000 PCB.* Are IC's plugged in correctly? Are IC chips the same? Is LK1 made? Are intrinsic plugs plugged in correctly?
Processor LED not flashing	Is Power LED on? Yes - *Replace C3000 PCB* No - *Refer below*
Power LED off	Is the power to the C3000 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 C3000 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 C3000 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 C3000 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 C3000 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 C3000 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 27)* *Carry out self test (see page 27)* No - *Check cable and plug.* *If no fault found, contact Compac Help Desk.*

11.1. End of Sale Indications

Version 25 software and beyond 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 Section 3.4.5 for method of displaying numerical indicator.

Numerical Indicator	*Readout*	*Explanation*
1.00	"NOZ"	Nozzle hung up.
2.00	"PRESET"	Stopped at the preset.
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.

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.
Head	C3000 PCB, complete in enclosure.
Intrinsically safe circuit	A circuit in which any spark or any thermal effect produced in the test conditions prescribed in this standard (which include 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

Comm's Links/Dipswitches

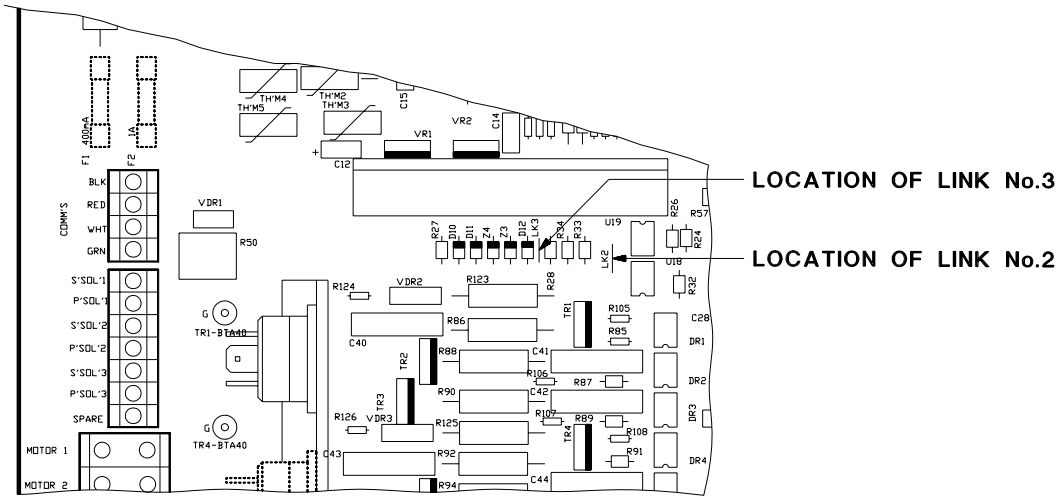


Figure 23. Location of Comm's Links

Either Link #2 or #3 will always exist on any C3000 PCB before Issue P.

Link #2 must be connected and Link #3 disconnected for interfacing to any controller or Comcard, Compin, or CWIDKey Basic printer.

Link #3 must be connected and Link #2 disconnected only when a C3000 'Futra' type 'head' is interfaced to a PC or a printer.

COMPAC

MADE TO MEASURE

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