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WD2000 / WD2500 / WD3000N

Water Filling Station

OPERATIONS MANUAL

Revision: 2.3

PREPARED BY

ABBERFIELD TECHNOLOGY PTY LTD
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Document Control Sheet

AMENDMENT RECORD

Revision	Change History	Release Date	Names
1.0	Initial Release	10/12/15	SSmith
2.0	Merged WD2500 and WD3000N operating manuals	13/05/16	SSmith
2.1	Amendments – edited text	13/07/17	John colyer
2.2	Amended shut down procedure – minor changes	30/05/18	John Colyer
2.3	Amended Shutdown	5/10/22	John Colyer

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SCOPE

This document describes the operational procedures that may be required to run the WD2500/WD3000N Tanker Filling Station.

ABBREVIATIONS

CAS	Card Access Services
TFS	Tanker Filling Station
TMS	TFS Management System
VMC	Vending Machine Controller

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1 DESCRIPTION

The WD2000/WD2500/WD3000N Tanker Filling Stations, (otherwise known as Water Filling Stations), allow for delivery of potable water services via credit card or account card payment. They provide the following benefits:

- A streamlined method and systems for delivering this service
- Efficient revenue collection
- Support customer expectations
- Low ongoing maintenance cost
- Reduced cost to serve through automation of access, data collection, and billing
- A reliable source of usage data
- Convenient and consistent methods of pre-payment and post payment options across all locations
- Can be updated with new technologies
- A compliant system

Figure 1 - WD2000 Tanker Filling Station

Figure 2 - WD2500 Tanker Filling Station

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Figure 3 – WD3000N Tanker Filling Station

1.1 ACCOUNT CARD SOLUTION OVERVIEW

The system comprises of four (4) main parts:

- Tanker Filling Station – This is the scope of this Operations Manual
- Card Access Services – The service provided to process payments and provide billing information to the TFS administrator.
- Customer billing – billing of account card holders (service can be provided by Card Access Services)
- Operator Admin – processes customer queries and can access machine logs through the Tanker Filling Station Management System (TMS) Web Portal

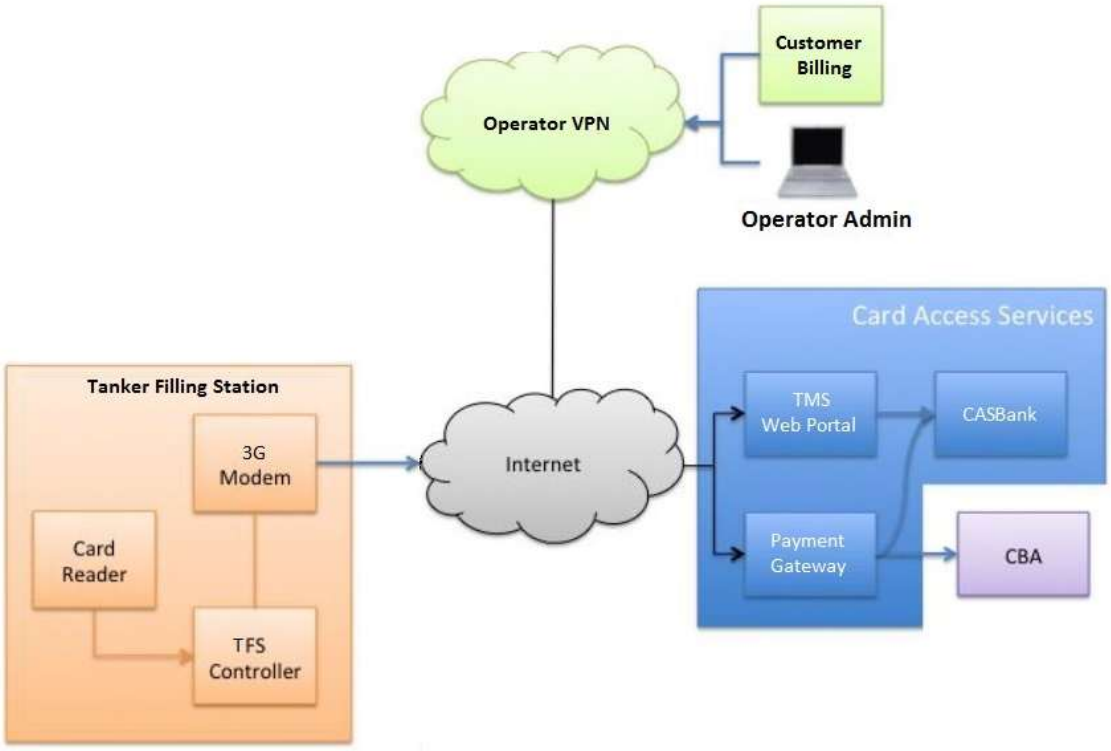

Figure 2 – Account Card Solution Overview

This document concentrates on the Tanker Filling Station only. For more information on TMS, Payment Gateway, ETX or CASBank please see the Card Access Services manual.

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1.2 TANKER FILLING STATION OVERVIEW

The **WD2500** has been designed for up to 50mm plumbing entering vertically through the base of the cabinet stand. Two (2) outlets can be installed; a cam lock (up to 50mm) and ball valve screw fitting (up to 25mm) allow for both commercial and domestic users. Contained within the housing are the water meter, water valve and solenoid valve. The WD2500 also allows room for the installation of backflow prevention with a testable dual check valve as pictured below.

Figure 3 - WD2500 with internal backflow prevention

The **WD3000N** has been designed for 80mm or 100mm plumbing entering horizontally through either side of the cabinet. Two (2) outlets of 80mm/100mm cam lock and 25mm screw fitting (optional) allow for both commercial and domestic users. Other outlet combinations can be provided. Contained within the housing are the flow meter, water valve and solenoid valve.

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1.3 Tanker Filling Station Features

Features of the tanker filling stations include:

1. **SELF CONTAINED FUNCTIONALITY**
   An all in one purpose-built housing. Just add water and power, includes;
   I. Mains distribution board module (optional)
   II. Payment system (credit card and account card using the one card reader).
   III. Water delivery plumbing.
   IV. Solar charged battery operation (optional).

2. **QUALITY SYSTEM**
   All equipment is produced in stainless steel powder coated to the customer's choice of colours or the default colour of Acid Green.

   Screw fastening throughout are of stainless steel.

   The machines use a time tested "top down" mounting system that provides maximum physical security whilst allowing ease of removal for relocation of equipment.

   Simple customer interface with kick-proof buttons.

   Electronic component parts are plug-in modules for ease of exchange by unskilled persons.

3. **PURPOSE DESIGNED**
   System will meet present and future requirements. Modular components allows variations.

4. **AUSTRALIAN MADE**
   Designed and manufactured by Abberfield Industries.
   Australian owned and operated.

1.4 Tanker Filling Station Breakdown

The Tanker Filling Stations have three distinct compartments to house equipment.

- **Controller Cabinet** – This will hold all the control, payment and power supply modules for the Tanker Filling Station.
- **Switchboard Cabinet** – Where mains power is being supplied. Contains all isolation and safety devices and includes a power outlet.
- **Plumbing Stand** – Contains plumbing devices and mounting structure for the machine.

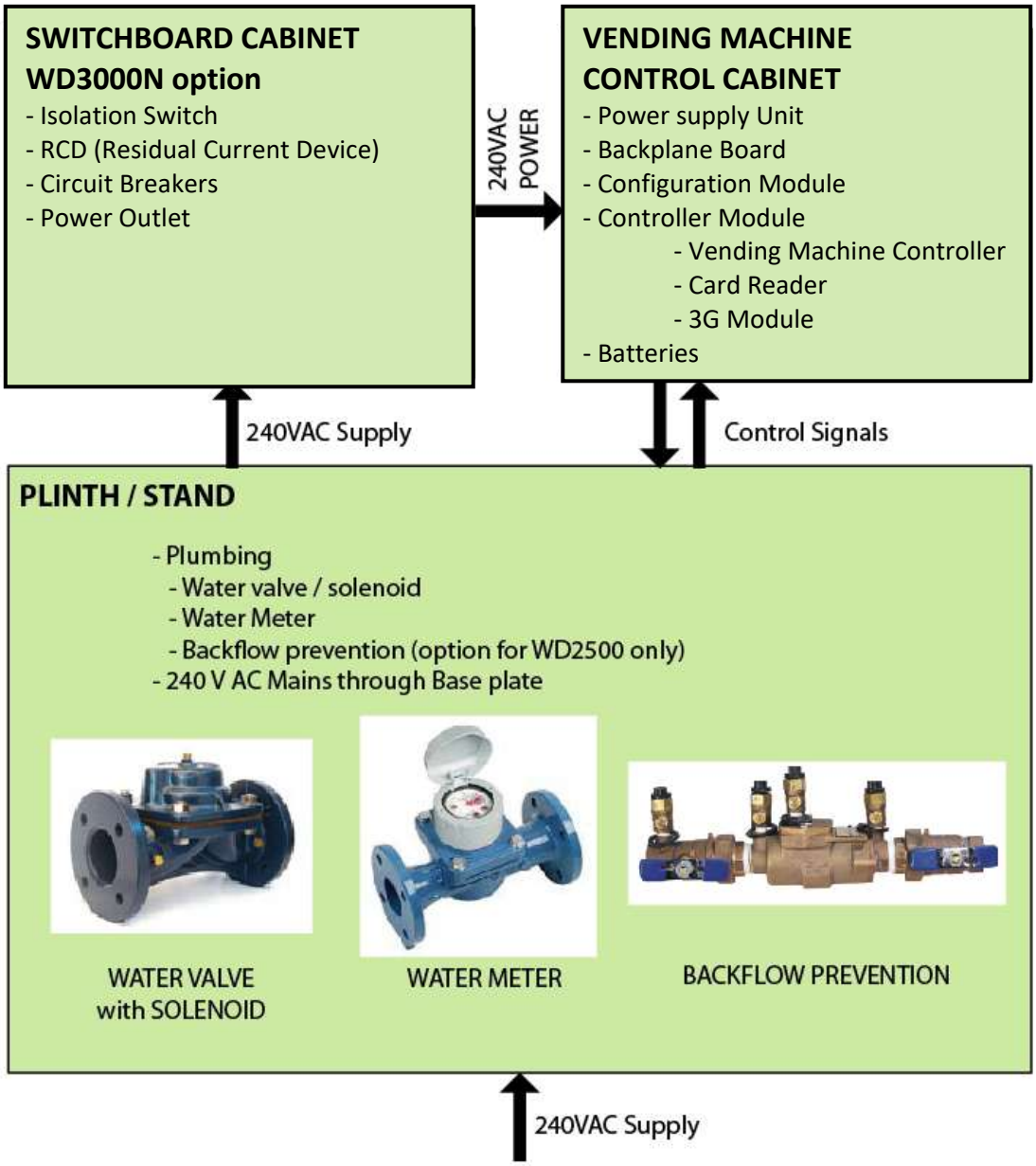

Figure 4 - Machine Breakdown

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1.5 Solar Panel (optional)

A solar panel can be mounted in an overhead heat shield. This panel is sufficient to keep the battery charged during normal daylight operation and the battery will operate at night. Mains are therefore provided as a backup to cater for inclement weather, or for reliable operation with an aging battery.

Should operation under solar only be required (no mains), then an external solar panel and a larger battery with a regulator is required, for full time operation (allows for multiple days with poor sunlight).

Alternatively, with only the on-board solar panel, the machine can operate in **SLEEP MODE** and will “wake up” when any button is pressed by a customer. The customer display still operates during SLEEP MODE to provide instructions to the customer.

2 STANDARD MACHINE OPERATION

2.1 Customer Interface

The customer will have access to physical taps to be able to turn off/on either outlet as they require. Payment and selections will be made from the Payment Interface on the Controller Cabinet. The Payment Interface will consist of:

- Controller Display - 2 line x 16 character OLED low power display
- Card Reader accepting:
    - MasterCard, Visa, contact and contactless chip cards. Note: some customers use contactless chip only and the card reader is recessed behind a secure fascia. This method provides greater physical security.
    - Pre and post-paid private accounts (Mifare cards) – "SMART Cards" (OPTIONAL)
- 4 selection buttons
    - UP - increase value selected
    - DOWN - decrease value selected
    - ENTER - Select Value, Accept vend price
    - FINISH (CANCEL) - Finish or cancel the vend (backed up by a timeout)

Figure 5 - Customer Interface

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2.1.1 Typical Vend Scenario

STEP	CUSTOMER ACTION	EXPECTED RESULT
MACHINE IDLE		Display reads: (details customised for each customer) **ENTER 238 L** **$4.19 /KL $1.00**
1.	UP / DOWN arrows pressed to select quantity. ENTER PRESSED	$ and Litre value move according to UP/DOWN presses. When value selected (ENTER pressed) display reads: **PRESENT CARD** *Only the amount taken will be charged*
2.	**PRE AUTHORSATION** Customer presents Credit Card or Account Card (tap card on card reader)	Display reads: **PRESENT CARD** Pre-authorisation of credit card carried out for selected value. *Card reader displays progress of transaction*
		Successful Pre-Authorisation - Display reads: For Smart Card customer: **<ACCOUNT HOLDER NAME>** For Credit Card Customer **CONFIRM 238 L** **$4.19 /KL $99.00** ENTER must be pressed to confirm amount is correct and customer is ready for water
3.	ENTER pressed	Electric water valve turns ON (opens) Display reads e.g.: **Water 0 L** **$4.19 /KL $0.00**
4.	Customer opens tap	Display updates with cumulative totals e.g.: **Water 12000 L** **$4.19 /KL $50.28**
5.	CANCEL/FINISH pressed *OR* Preauthorised limit reached *OR* No pulses for 2 minutes (configurable)	Credit Card or Smart Card charged Card Reader says “Thank you and goodbye” Display reads e.g **Complete 12000 L** **$50.28**

2.1.2 OPERATING ISSUES

This occurs most often for new users. When talking to a customer about problems please ask the following:

- What location are you at?
- What do the displays say when you get the problem?
- Credit card or smart card?
- If credit card - What are the last four (4) digits of the card? (this allows tracing through the TMS Web Portal)

Common Problems include:

- **Card reader won't validate card**.
  - Customers may try to use the card reader before selecting a price. This will result in the card reader displaying "Please remove card". Solution – The customer must press ENTER before presenting card
  - Customer may be using an invalid card or not using the card correctly. Make sure the card says MasterCard, VISA or is an approved account card.
- **Not receiving water**
  - Customer may not have confirmed after successful pre-authorisation. Press ENTER to confirm transaction to proceed. This confirms both the price and that the customer is ready and that it is safe to proceed.
  - Card may have been declined.
  - Timeout waiting for water to be dispensed. There is a timeout for each stage. If the customer confirms they are ready for water but takes none within the timeout then the machine will cancel the transaction. The timeout period is settable at the TMS Web Portal.

2.1.3 Diagnosing problems at a machine:

- Report the state of the machine when you arrive
  - **What do the displays say?** This may tell you the cause of the problem
  - Are buttons responding?
- Try a transaction.
  - Does the transaction work as expected?
  - **What do the displays say? Do they act as you expect for each step**
  - Was water dispensed?
- Restart the machine
  - Only after trying the above actions and writing down any issues then restart the machine

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2.2 Shutdown

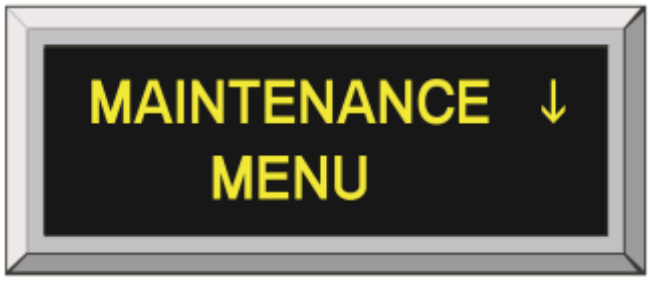
The added advantage is, because there is a preferred method of shutting down the machine, when shut down correctly the machine will download operational details to the data processing portal. In part this includes battery voltage and internal temperature.

1st Generation Software

These machines have a push button adjacent to the aerial connections on the controller.

To shut down these machines, press the button and hold for approximately five seconds.

The customer display will show



And after five seconds it changes to

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Release the button and the display says

When the controller has shut down the display says

Then turn off the controller with the SYSTEM switch, positioned on the configuration module. If the SYSTEM switch is not turned off the controller will time out and restart.

Shutdown Through the Menu

On the side of the controller is a push button.

Press this button situated next to the aerial connections.

Screen says

Press the DOWN button

Screen says

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Press the DOWN button

Screen says

Press the DOWN button

Screen says

Press the DOWN button

Screen says

Press the DOWN button

Screen says

Press the DOWN button

Screen says

Press the DOWN button

Screen says

Press the DOWN button

Screen says

This is the screen you want for the shutdown routine. Therefore, press the ENTER button.

Screen says

Automatically changes to

Then changes to

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When the screen comes up with POWER DOWN OK the SYSTEM power switch on the configuration module can be turned off. Turning off this switch causes the machine to totally shutdown.

If the SYSTEM power switch is not turned off the machine will automatically restart.

2.3 Bypass

Some circumstances may require water delivery without the use of a credit card or account card. This may include testing, dispensing free water or machine malfunction.

2.3.1 Electronic Bypass

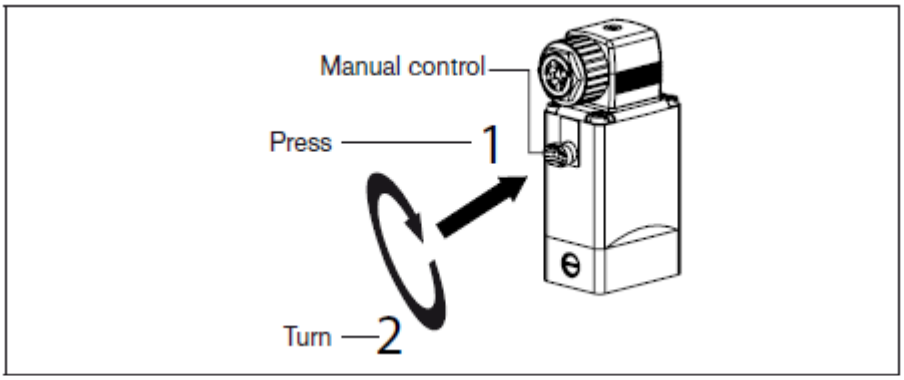
Electronic Bypass is controlled from within the control cabinet. It provides power directly to the solenoid valve, bypassing the Tanker Filling Station controller. This is most suitable for testing the solenoid valve or providing customers water for a short period of time. To use toggle the “Bypass” switch to ON, then turn OFF when finished.

NOTE: Electronic Bypass consumes power so is not recommended for extended periods where mains power is not available.

The electronic Bypass will work even if the controller is removed.

2.3.2 Mechanical Bypass (fitted to WD3000N Filling Station ONLY)

For most systems Electronic Bypass is controlled from within the stand. The manual control is located on the solenoid valve, which is forms part of the water valve. **This is the preferred method of bypass for extended periods**.



NOTE: When mechanical Bypass is locked, the valve cannot be actuated electrically.

Machine Software Menu

On the left side of the controller is a push button (1st generation machines had a switch).

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Press this button

Screen says

The arrow ↓ refers to pressing DOWN.

Screen then says

BB FW refers to ***base board firmware***

The version number (????) would be 1.16 or above.

The arrows ↑↓ refer to pressing UP or DOWN

Press DOWN

Screen shows

VIN refers to mains derived low voltage. 1st and 2nd generation machines were set between 12.5 Volts to 17 Volts (depending on the stage of the system upgrades).

It is expected that later machines are set at 13.8V, even though the controllers can operate from less than 12 Volts to more than 20 Volts.

VSOL is the input voltage from the on-board solar panel (if fitted).

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Press DOWN

Screen says

VBAT1 is the voltage of the internal battery, positioned to the left under the controller.

VABT2 is the voltage of the internal battery positioned to the right. This battery is charged by a remote solar panel. Therefore battery 2 is usually not fitted to the right of battery 1, but is usually a larger battery (100 AMP/hours) fitted inside the switchboard of the WD3000N machine.

Press DOWN

Screen says

This screen shows the type of battery installed.

Batteries are usually a **GEL** cell type but could be a **LITHIUM** type. Depending on the date of the manufacture of the battery module the **BAT1** may say **None**.

Since the battery type feedback comes from Abberfield's purpose-built controllers, and the external solar panel charged battery in the switchboard (using a conventional regulator) the battery type will be shown as **None**.

Press DOWN

Screen says

This confirms that the configuration module (under the power supply) is present and has the correct parameters.

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Pres DOWN

Screen says

This confirms some aspects of the electronic controller.

Press DOWN

Screen says

If buttons are not to be tested press UP or DOWN as required.

To test the buttons press ENTER. Then then display will show <U> (Up), <D> (down), <E> (enter), or <C> (cancel), depending on which button is pressed.

Note: This button assembly is rugged (solid metal outside) and operates a reed switch through the stainless steel door by magnetism (magnet on the button). The reed switch has contacts operating in an inert gas so contact corrosion does not occur. These buttons have an extraordinary long reliable operating life. But they have to be set up correctly, done by Abberfield at time of manufacture.

For a higher level of testing the buttons can be pressed in slowly and the displayed symbol (i.e. <E>) should come up mid to ¾ travel, i.e. there is some extra button travel after the symbol is displayed.

Then release the button slowly and the symbol should extinguish mid to ¾ travel, with some extra travel remaining. If the button won't turn on, or is on and won't turn off, then there is a problem. If the buttons work but transition on or off at the very end of the button travel (on or out) then the system is working but is out of adjustment.

Press DOWN

Screen shows

This is the screen you want for the shutdown routine. Therefore, press the ENTER button.

Screen says

Automatically changes to

Then changes to

When the screen comes up with POWER DOWN OK the SYSTEM power switch on the configuration module can be turned off. Turning off this switch causes the machine to totally shutdown.

If the SYSTEM power switch is not turned off the machine till automatically restart.

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Press DOWN

Screen shows

Press ENTER

Screen returns to the idle mode

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SERVICE AND MAINTENANCE

2.4 Solar Panel

2.4.1 Cleaning

If fitted, the solar panel fitted on top of the cabinet should be cleaned regularly or it will become less effective. Leaves and solid matter will prevent the area covered from generating power. However, it is easy to forget that a dirt film across the whole panel area will affect the entire panel. Periodic washing of the panel with very mild detergent is recommended.

2.4.2 Removal and Replacement

(WD3000N with solar panel in heat shield only)

If ever the solar panel is damaged by large hailstones (hasn't happened yet), the product design allows for simple replacement by non-trades personnel.

REMOVAL

1. Remove four Allen headed cap screws on top of the heat shield – keep screws and washers.
2. Remove six (three each side) M4 nuts form the underside of the heat shield.
3. Lift off heat shield.
4. The solar panel will be found to nest inside the tray and may be lifted from that tray.
5. The lead from the solar panel will have a polarised plug position in the lower section of that tray allowing disconnection.

REPLACEMENT

1. Reverse the above procedure, remembering to reuse the nylon washers underneath the cap and security screws.
2. To confirm operation of solar panel, open door of control cabinet and check the status lights on the configuration module. The light label "solar" should be illuminated.

2.5 Control Cabinet

Components in the Control Cabinet are designed around Abberfield's black box "plug'n'play" architecture. This allows non-technical staff to perform service work by simple removal of components and replacement with spares. Removed components can then be returned to Abberfield for service.

2.5.1 Removing the Components

The three (3) mains components in the Controller Cabinet are the 12V power supply, Controller module and optional Battery Box. The following steps can be used to remove any of these components:

1. Perform a Soft Shutdown of the machine.
2. Undo the two (2) mounting screws holding the component in place (flat head screwdriver required).
3. Pull the component out.

Replacement is reverse of removal.

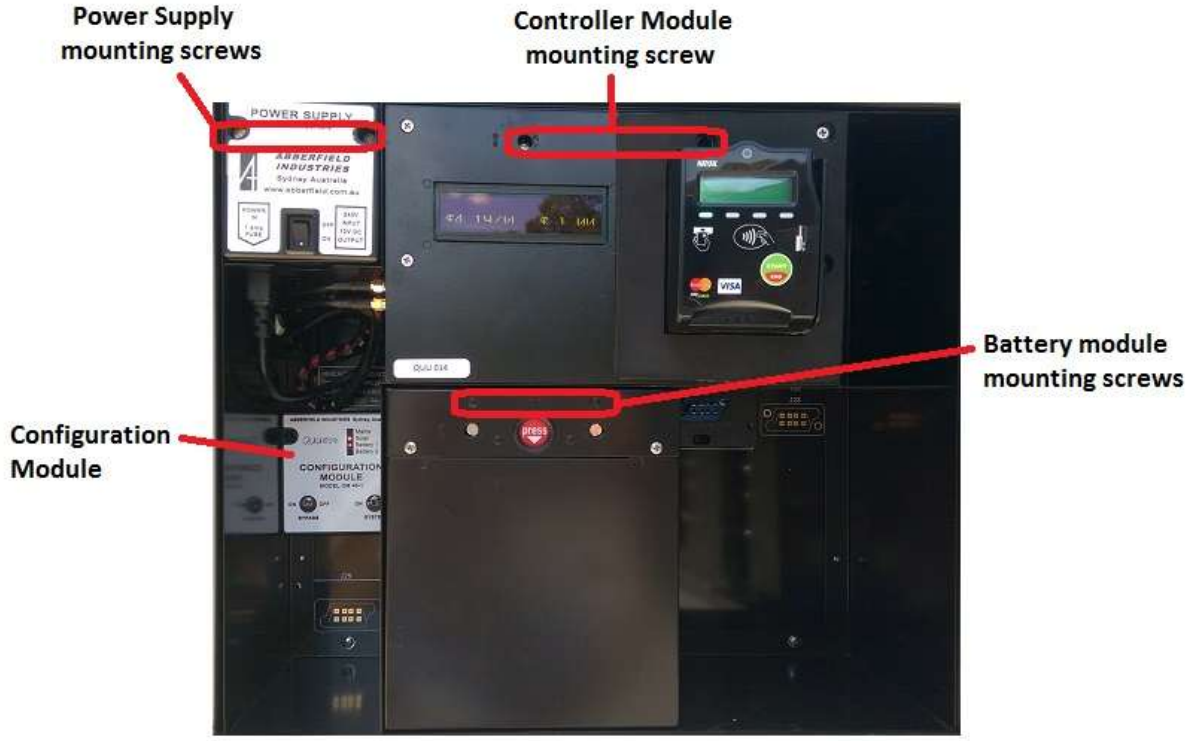

Figure 6 - Module mounting screws

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2.5.2 Configuration Module

This plug in device holds the site identity and any site specific settings. The configuration module will be marked with the site identity number and this device should remain in place at all times.

2.5.3 Replacing the Power Supply fuse

First remove the power supply.
On the mains inlet socket there is a rectangular panel that can be prized open with a small screwdriver.
Slide out the panel and attached carriage.
Inside will be two fuses. The inner most fuse is the one in circuit and the outer fuse is a spare. Replace a blown fuse as required.
Slide in the carriage which will clip into place and automatically engage the fuse.
If purchasing new fuses, use 1 or 2 AMP fuses.
Lower current rated fuses may be used but 1 AMP allows for mains line surges.

2.5.4 Insect Infestation

Perhaps the greatest reason for equipment failure in country placed electronic equipment is insect infestation.
Insect nests or dead insects cause current leakage between component parts. This can cause the equipment to malfunction or to physically fail. The equipment is produced as semi-sealed black boxes, partially to keep insects off the electronic components. But ants in particular are small and further protection is needed.
On a regular basis the equipment itself and the ground around should be sprayed with insect repellent surface spray.
Nepheline flakes or balls in a sealed container should be placed inside the cabinet to help repel these insects.

2.5.5 Battery Control

To ensure reliable system functionality the operation will shut down when the battery system falls below a pre-set level. Shut down will not occur during a transaction taking place. Reconnection of the battery supply will not occur until reasonable battery voltage has been re-established. This is to ensure that the system does not cycle on and off during the charging process.
If a solar panel is used it will charge the large battery during sunshine and the battery will operate the machine, even if mains is connected, which acts as a backup for inclement weather. Alternatively, the Tanker Filling Station can operate in **SLEEP MODE.** In this mode most of the electronics are turned off, saving considerable power and are awakened by the pressing of any button. When wireless communication is established the machine will operate as normal and on completion of a transaction it will remain alive for a pre-set period, approximately fifteen minutes.

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2.5.6 Contact Cleaning

Twice a year the contacts on the self-aligning gold-plated blue module plugs should be cleaned. This prevents oxidisation and ensures the best system reliability. Isopropyl alcohol is recommended although methylated spirits is a reasonable substitute. Smearing the contacts with a light film of Vaseline is useful if regular cleaning cannot be assured.

2.5.7 Lock Cam Greasing

The lock cam (butterfly shaped cam on the back of the lock body) can be greased to provide a smooth operation. At the time of manufacture these cams and sliding lock bars were smooth in operation, but dust and dirt accumulation may cause the need for infield lubrication. Light machine oil on the back of the bars is recommended. Also, any misalignment during the installation process may affect the smooth operation of the cams. As the manufacturer Abberfield Industries would carry out additional maintenance but in general the items listed should prove sufficient for the end customer to administer.

Maintenance / Service Checklist

1. Make sure the nut on the rear of the lock body remains secure. There will be a tab washer bent up around two of the flats of the holding nut and these provide positive protection against the nut loosening. Check that the tabs remain in place as a nut falling off with the cabinet locked will prevent key access.

2. Check that the lock operates smoothly, both with the door in the open or closed position. If resistance is observed a serviceman should attend for repairs.

3. Perhaps as part of the lock inspection, check that all doors close with proper alignment. If out of alignment the locking system may not operate correctly.

   When installed the cabinet can be distorted and a serviceman may be required to make adjustments.

4. Check that the buttons operate freely and do not stick when fully depressed. For unexpected repair details contact Abberfield Industries.

2.6 Plumbing Maintenance

The Tanker Filling Station plumbing requires minimal maintenance.

Figure 7 - WD2500 with internal backflow prevention

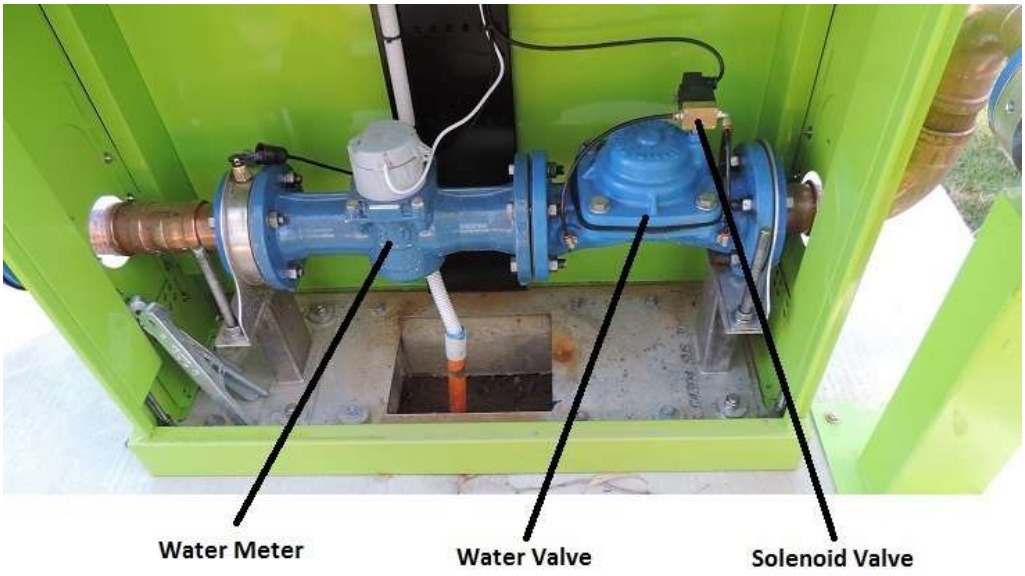

Figure 8 - WD3000N Plumbing

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2.6.1 General Leaks

- Check for leaks at all the connection points and fix as required *Perform every six (6) months*

2.6.2 Water Meter

The water meter does not require service. If any faults are found, please contact Elster. *Repairs may only be carried out by the manufacture.*

2.6.3 Water Valve

WD2500 – There is little to go wrong but if replacing the solenoid take care not to lose the O-ring that seals between the valve body and the solenoid.

WD3000N - From the Emflow maintenance manual:

> *The valve should be checked on a regular basis manually to ensure that the valve operates correctly, to ensure that the diaphragm is not sticking against the valve seat if the valve has not been used on a regular basis. With new valves the valves should be checked over the first three months to ensure that the Diaphragm installed in the valve meets the requirements of the operator. The valve should be serviced at a period of 3 to six months to ensure that there is nothing in the valve that may affect the operation of the valve or block the water cannons. If a valve is leaking, this needs to be addressed by checking that the diaphragm is sealing properly or that the diaphragm is not damage or the valve does not have a broken spring. Broken springs can cause damage to the valve coating if the valve is allowed to operate with a broken spring. The coating is an important part of the valve because the coating is designed to protect the valve from rust or deterioration of the body and the lid of the valve which will affect the life span of the valve.*

WD3000N 80mm/100mm Butterfly Valve

Throughout the machine Abberfield Industries have used stainless steel screws. This prevents rusting and ensures a long service life in a potentially wet environment. However, purchased in water valves have plated steel screws on the tap holding the metal label. It is also noted that the blue paint on the water valves fades in Australia's sun. Therefore, very occasionally the gear head of the water valve (which is in full public view) should be cleaned and sprayed with pressure pack clear varnish.

If the gear head has a grease ripple the gear head should be greased at least once a year.

3 ONLINE SUPPORT

Additional to Abberfield's telephone technical support the company has an online Members section to access in depth information. Members sites are accessed from the home page of Abberfield's website, it is password protected.

Whatever information is considered relevant can be downloaded, including full workshop manuals, helpful hints, etc. By mutual agreement a customer's own documents may also be loaded onto this site.

Figure 9 - Online Support Instructions

4 TELEPHONE SUPPORT

John Colyer
Mark Townsend
Lurie Kristo
Nathan Hemsworth
Phone: **(02) 9939 2844**
Email: **contact@abberfield.com.au**
Mobile: **0414 427 708**

5 WARRANTY

Equipment produced by Abberfield Technology and their suppliers is covered by a one year back to factory repair or replace guarantee.

Extended warranties are available if a Partnership Agreement is negotiated. The principle of a Partnership Agreement is that the Operator and Abberfield Industries work together to support the best interests of each other.