Installation Manual

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1 Introduction.

This guide is designed to step through the installation of a SmartFill system, in the order of events that might take place during a normal installation. Please contact the manufacturer should you have any suggestions, or error corrections.

There are Icons used in this manual, which are designed to draw your attention to a particular area of importance. There are only 2 used, and their meanings are as follows...

WARNING. This icon idicates that the relevant information is warning you of a potential hazard, or mishap event that may occur if you do not read and follow the advice. It is extremely important that you read and fully understand any information following a Warning Icon.

TIP. This icon idicates that the information is a Tip to assist you, a suggestion or a shortcut to a better method

2 Safety Warnings.

- **HIGH VOLTAGE WARNING** - Some Smart-Fill systems involve / require hazardous electrical voltages to be present. Any electrical installation, testing, maintenance or repairs MUST be carried out by a suitably licensed electrician.
- Any safety concerns about the system should be immediately reported to your Smart-Fill supplier and the manufacturer.
- The system must be put out of order, suitably danger or out of service tagged, and must not used if you have any safety concerns.
- The Smart-Fill manufacturer's bear no responsibility / liability for any work carried out by unqualified service personnel.
- All wiring MUST be in accordance with the relevant local / state / national regulations as required, and in accordance with AS/NZS 3000:2000.
- Special care must be taken to ensure that the wiring and location of Smart-Fill systems is in accordance with the relevant regulations and authorities for that particular location.
- Special attention must be paid to locating equipment in possibly hazardous areas.
- The manufacturer can not provide advice or specification for correct wiring or hazardous area regulations, and in no way implies its suitability for use in any given area, this information MUST be sought by the installer, from the relevant authorities.
- Smart-Fill enclosures are not rated for use in hazardous areas, and as such the Smart-Fill must only be operated in a non-hazardous area.
- The safety panel inside the Smart-Fill MUST NOT BE REMOVED.
- If the safety panel becomes broken or is missing, please contact your Smart-Fill supplier immediately for a replacement safety panel.

2.1 Installing Company / Personnel Requirements.

- The quality of installation has a lasting effect on the performance of the equipment, and the value the SmartFill end user receives from the system. We can not stress enough the importance of safe and high standard installation and commissioning practice's. Thorough initial basic training of the client is also crucial to the client getting best value from the equipment. Obviously, adequate initial training also reduces the number of support calls that the installer receives.
- The installing company is responsible for ensuring that installation staff are competent, they are suitably qualified, and that work is performed in a safe manner, to a high standard.

3 Warranty Information.

3.1 Warranty terms.

1. The Smart-Fill manufacturer warrants each Smart-Fill system against manufacturing faults or defects for 12 months from the date of purchase on the manufacturer's sales invoice.
2. Every Smart-Fill system is manufactured with all possible due care in design and assembly, and with good intent.
3. Smart-Fill parts are warranted for a period of 12 months from the date of the original manufacturers sales invoice.
4. Due to the remote nature of most of this type of equipment, the following warranty terms are strictly adhered to.
   (a) Warranty repair labour is only covered at the manufacturer's premises.
   (b) All fault diagnosis, removal / replacement and freight expenses are at the owners expense. The manufacturers are not liable for any of the costs in diagnosing / repairing faults / freight etc.
5. Any faults caused by electrical disturbance, poor installation quality, misuse or neglect will not be covered by any warranty.
6. An on-site warranty may be able to be negotiated with your Smart-Fill supplier, however the manufacturer does not offer nor provide an on site warranty option.
7. The manufacturers may not be held liable for any product or data loss, equipment damage or loss, equipment or business downtime, personal injury or death which is either directly or indirectly caused by the system hardware or software, regardless of the cause of the failure.
8. If the above warranty conditions can not be agreed upon or are deemed unacceptable by the client, then the client must contact their supplier immediately to arrange a resolution, and must not use the SmartFill system until a resolution is agreed.

3.2 Special notes for use with generators.

WARNING

1. No warranty is available for Smart-Fill systems powered by portable generators, without an individual approval for the particular installation from Fluid Management Technology.
2. These approvals are issued only for a single installation.
3. A separate approval is required for each individual system being powered by a portable generator.
4. To enable the manufacturers to fully warrant any system connected to a portable generator, the system MUST be designed so that it is impossible for the generator to be started or stopped while the Smart-Fill is electrically connected to the generator power output. The Smart-Fill must only be powered up after the generator is running with a stable regulated power supply, and must be disconnected from the power supply before the generator is turned off.
5. At the very minimum a power failure relay and current sensing relay will be required when generator power is used.

4 Recommended Tools for Installers.

The following tools are required for SmartFill service and installation.

- Digital Multimeter, preferably with a DC voltage resolution of 3 digits. **We use and recommend the Fluke Model 117 True RMS Multimeter.**
- **A good quality small electrical flat blade screwdriver.** Poor quality screwdrivers do damage to terminals and prevent adequate tightening of electrical termninals etc.
- A general set of flat and philips screwdrivers.
- Metric and Imperial Hex (Allen) keys. Long ball head types are recommended.
- A cordless drill, with backup batteries.
- Metal Holesaws, sizes 16mm, 20mm, and 32mm.
- Flat and round files (for deburring metal holes).
- Pointed, and Side cutting pliers.
- Multi-Grip type pliers.
- Metric tape measure.
- 

The following tools are highly recommended, they make working with SmartFill easier...
    - Deep 10mm and 13mm sockets, 1/4" or 3/8" drive with long extensions.
    - 1/4" drive screwdriver handle with 7mm and 7/32" deep sockets fitted. The ends of the sockets should be machined or carefull ground down to reduce diameter at the end of the sockets.
    - 3/8" x 7/16" Open End Spanner.
    - 13mm Open End / Ring Spanner.

5 Pre-Installation Checks.

Check the condition of the SmartFill and its associated parts when opening. Advise your SmartFill supplier immediately if any items are damaged or missing. Its obviously best to carry out this check prior to travelling to the job.

- Check for the following items...
    - The SmartFill Control Box.
    - 20 vehicle ID keys (ibuttons) with keytags.
    - USB Drive containing SmartFill PC software.
    - Mounting kit.
    - Power supply wiring instructions.

6 Mounting the SmartFill.

6.1 Choosing the Location.

The position for mounting of the SmartFill is to be determined by the installer, who should also consult the owner prior to a final decision.

1. WARNING  Positioning and Location of the SmartFill MUST be in accordance with electrical regulations.
2. WARNING  Location must be in accordance with hazardous area regulations, with regard to flammable zones etc.
3. WARNING  The SmartFill is NOT approved for use in a hazardous / flammable zone.
4. The SmartFill manufacturers can not provide advice with regard to hazardous zones.
5. The installer is responsible for correctly selecting the location of the SmartFill.

Only after the above regulations have been satisfied can you proceed further.

6.2 Mount the SmartFill to the pump / flowmeter.

WARNING

-  Take care not to damage internal SmartFill components when drilling into the enclosures. You may need to remove internal components while drilling to avoid damage.

WARNING

-  Always wear a dust mask for breathing protection when drilling enclosures.

Providing that the SmartFill meets the requirements of 6.1 on the preceding page, then the following should also be considered prior to installation.

- The height of the SmartFill enclosure for operators ease of use / access.
- The door can be opened far enough to easily fit SD card for downloading.
- The door can be opened far enough to easily service the unit.
- Where possible, face the door away from prevailing weather.
- The SmartFill does not impede access to the pump for servicing.
- In very hot areas, if possible face the SmartFill display away from morning / evening sunlight. ie: face the display North or South.

6.3 Mounting Dimensions.

Generally, SmartFill systems have been built into 2 types of enclosures. However there have been custom systems built over time that have used non standard enclosure types and sizes. A new type of enclosure is being introduced during 2012, which provides more internal space for components, and it also makes installation easier for access to wiring terminals etc.

- 'R' Type enclosures are polycarbonate enclosures used since 1997.
- 'T' Type enclosures are slightly larger enclosures introduced in 2012'.

6.3.1 'T' Type Standard Enclosure (Part No P1503).

This type of enclosure is standard equipment for SmartFill systems from mid 2012. This enclosure requires the installer to drill mounting holes in the enclosure, or use the additional mounting brackets supplied with the equipment.

- Enclosure outside dimensions in mm, 250w x 300h x 150d.
- Suggested mounting hole dimensions in mm, 4 of 8mm Holes, on a rectangular layout of 215 across, 250 High.
- Mounting Bolts, 4 of 8mm x 30mm Zinc Set Screw with Nut and Flat washer.

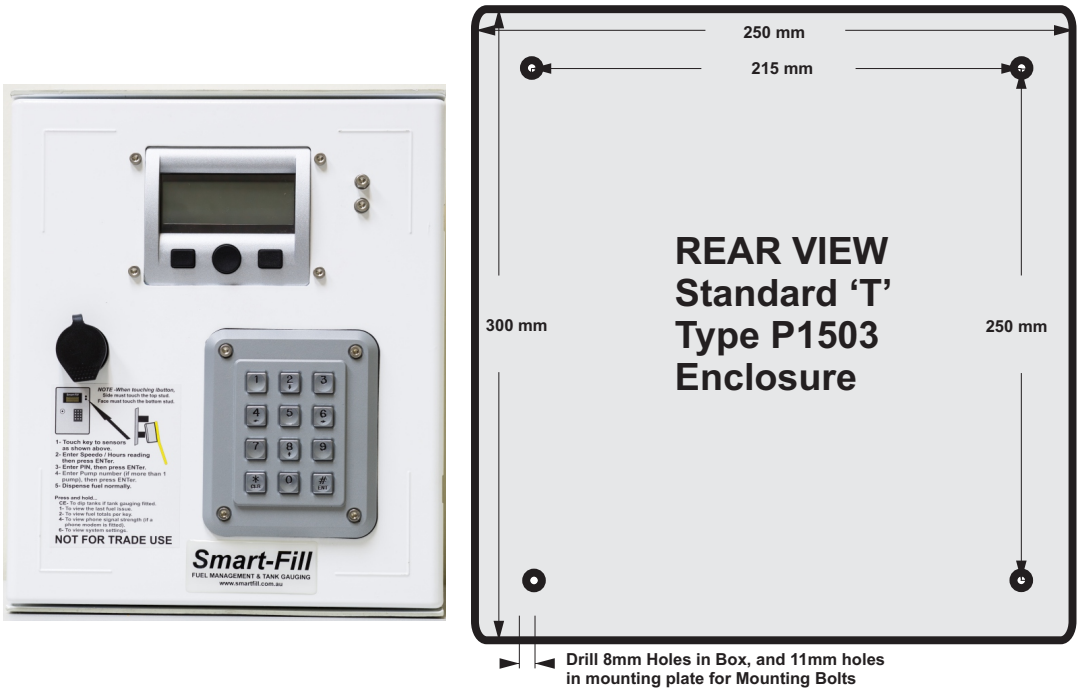

Figure 1: Standard P1503 Enclosure mounting dimensions.

6.3.2 'R' Type Standard Enclosure (Part No A1026).

This enclosure is standard equipment for SmartFill systems from 1997 through until mid 2012. This enclosure has 8mm brass nuts in the rear of the box for mounting of the enclosure.
NOTE- For vehicle mounting, it is recommended that the enclosure be mounted by drilling into the enclosure and fitting more securely.

- Enclosure outside dimensions in mm, 200w x 300h x 160d.
- Suggested mounting hole dimensions in mm, 4 of 11mm Holes, on a rectangular layout of 150 across, 250 high.
- Mounting Bolts, 4 of 8mm x 30mm Zinc Set Screw with Nut and Flat washer.

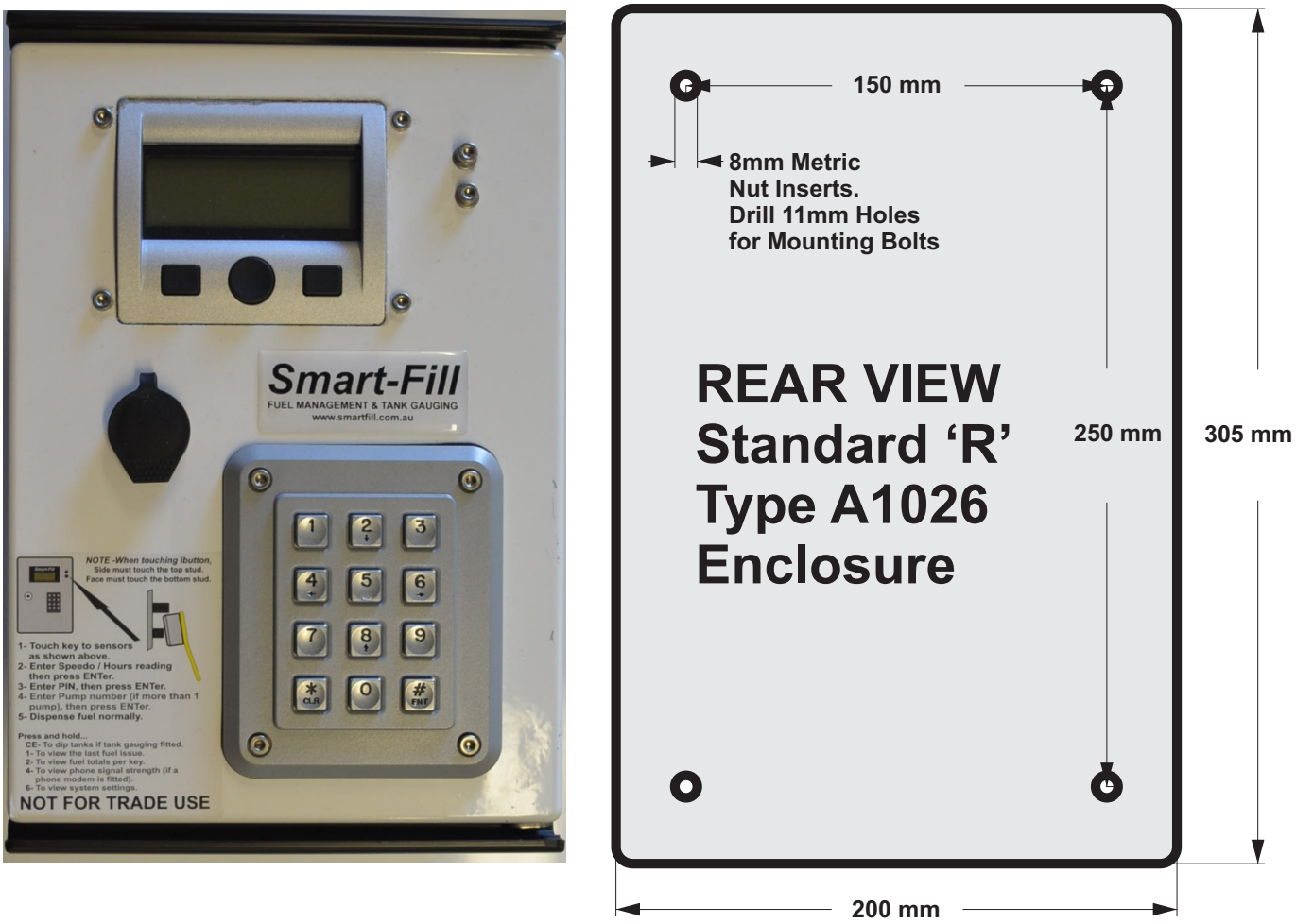

Figure 2: Standard A1026 Type R.

6.3.3 'R' Type Medium Enclosure (Part No A1053).

- Enclosure outside dimensions in mm, 250w x 350h x 160d.
- Suggested mounting hole dimensions in mm, 4 of 11mm Holes, on a rectangular layout of 200 across, 300 High.
- Mounting Bolts, 4 of 8mm x 30mm Zinc Set Screw with Nut and Flat washer.

This type of enclosure is standard equipment for SmartFill systems built with Acme Totalisers from approx 2006. This enclosure has 8mm brass nut inserts in the rear of the box for mounting of the enclosure.
NOTE- For vehicle mounting, it is recommended that the enclosure be mounted by drilling into the enclosure and fitting more securely.
This enclosure has also been used for some multi hose and custom built systems.

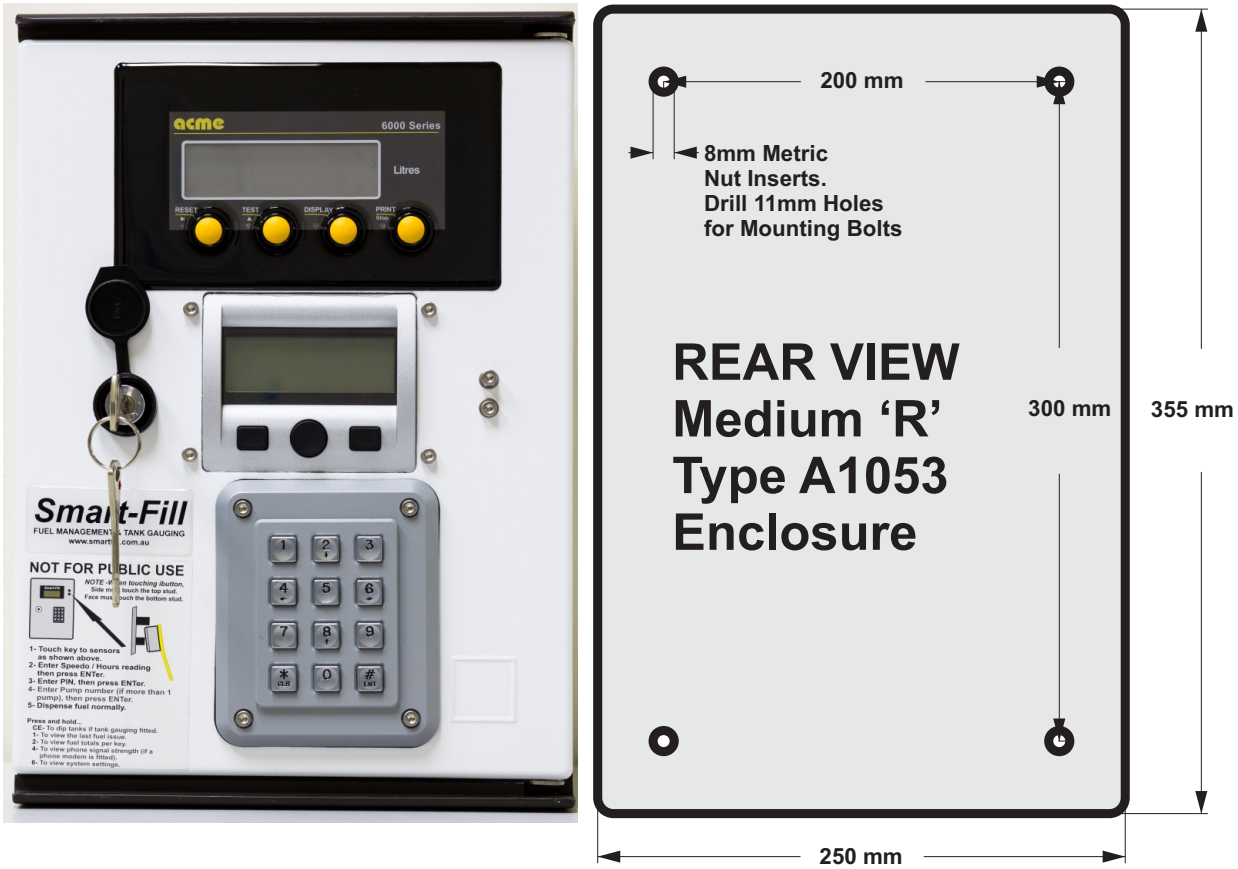

Figure 3: Medium A1053 Enclosure mounting dimensions.

7 Power Wiring.

7.1 General Warnings.

WARNING

WARNING

- Power wiring must only be installed / connected by suitably qualified personel.
- Wiring must be safe and in accordance with all relevant Australian and Local / Site Standards.
- Wiring / conduit etc must be suitable for the particular zone / area.
- Low voltage pulser wiring MUST NOT be contained in the same conduit as high voltage wiring.

7.2 Emergency Stop Switch Recommendations.

- It is recommended, though not compulsory that any emergency stop switch only disconnect power to the fuel pumping system, but not to diconnect power to the SmartFill. This is to ensure that a fuel delivery is recorded correctly in the event an Estop switch is activated. Some sites will use the Estop to stop the pump in normal operation, and in such cases the risk of data loss / corruption is higher if power is disconnected by the Estop.
  However should any regulations require the complete powering down of the system as well as the SmartFill, then it should be clearly marked that the Estop is for emergency use only, not to be used to simply stop the pump.
- If an emergency stop switch is to be used also as a pump stop, then it should be wired in series with the input to the SSR in the SmartFill, where it will then behave also as a Nozzle Switch.

7.3 Nozzle Circuit Sensing.

Before wiring the SmartFill system, designers / installers should consider if the nozzle sensing feature used in the SmartFill can be used. The nozzle sensing circuit simply detects if the nozzle handpiece has been lifted from its holster, and then, most importantly, when the nozzle has been stored, or a switch has been operated. Using the nozzle sense system enables the SmartFill to save the fuel delivery immediately when the nozzle is returned, instead of waiting for the Walktime (no-flow) timout to expire.

The SmartFill does this by using a relay contact, which is connected to the main processor. A switch needs to be fitted in series with the mains power feed into the SSR. In a fuel bowser such as an early style Gilbarco T334 Fletline, there is already a nozzle switch installed in the junction box.
When the mains power on the input side to the solid state relay (SSR) is ON (nozzle lifted), the relay is activated and its contact closes, then the processor can see that the nozzle is lifted.
The relay is monitored during the fuel delivery, and when the nozzle is stored the relay contact opens, because the mains power to the SSR is removed by the nozzle switch. The processor sees that the nozzle has been stored, and then saves the fuel delivery.

7.3.1 Over-riding the Nozzle Sense Circuit.

The Nozzle Sensing Circuit can be over-ridden, by simply fitting the link clip onto the 2 pins which are located to the lower left of the main processor, as shown below. Over-riding the Nozzle Sensing Circuit makes the processor see at all times that the nozzle is lifted, and therefore fuel deliveries will only be saved after the walktime expires.
Nozzle sensing is bypased when the Link is fitted across the 2 pins.

7.3.2 When Nozzle Sensing CAN be Used.

- When the mains signal into the SmartFill is switched by a relay or switch contact (NOT switched by SSR).
- When the nozzle switch is operated either by the nozzle, or by the operator to start / stop a fuel delivery.
- When the nozzle switch remains closed for the duration of the fuel delivery.

7.3.3 When Nozzle Sensing CAN NOT be Used.

- When the mains signal into the SmartFill is switched by a solid state relay (SSR). The slight voltage / current leakage through an SSR can cause problems.
- When the nozzle switch does not remain closed for the duration of the fuel delivery.

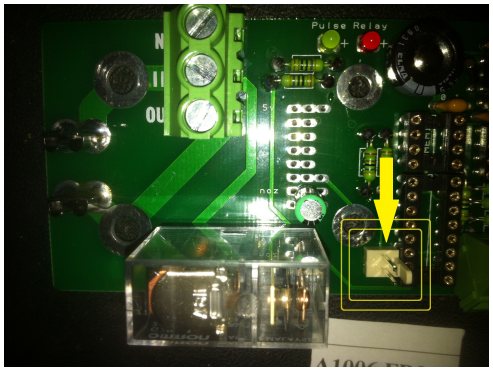

Figure 4: Nozzle Sensing Over-ride Link.

7.4 AC System Wiring.

7.4.1 Single AC Wiring - SF1006.

SmartFill wiring guide.
Ps01 power supply connections.

Fuses, type 205 (20 x 5mm)...
1- 1A. 5v supply to Smart-Fill electronics.
2- 2A. 24v supply to Smart-Dip.
3- 2A. 24v supply to modem
4- 2A. 240vac mains power in.

Bleed Resistor
In some instances, a contactor or relay may stay engaged after the SmartFill relay turns Off. This is due to current leaking through the Solid State Relay.
To avoid this, fit a bleed resistor between the N and Out connections.
Warning **a bleed resistor may become very hot if the bypass switch is turned ON**
A 12K 6W resistor may be used as a bleed

Control relay connections.

N = Neutral supply to the SmartFill .
IN = 240vac into Relay. This is either linked directly to the active supply or to a 240V feed from a start/stop switch etc.
OUT = 240vac switched output from Relay to the load: Motor or contactor

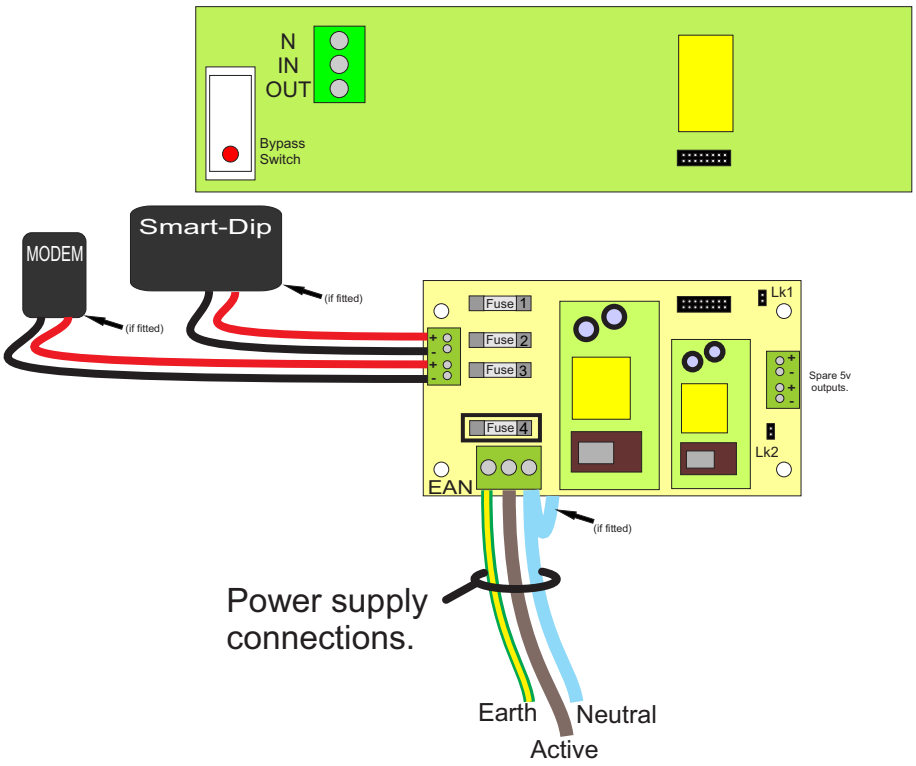

Figure 5: Single AC SF1006 Wiring

SmartFill wiring guide.

Dual AC SmartFill with board mounted bypass switches.

Fuses, type 205 (20 x 5mm)...
1- 1A. 5v supply to Smart-Fill electronics
2- 2A. 24v supply to Smart-Dip.
3- 2A. 24v supply to modem
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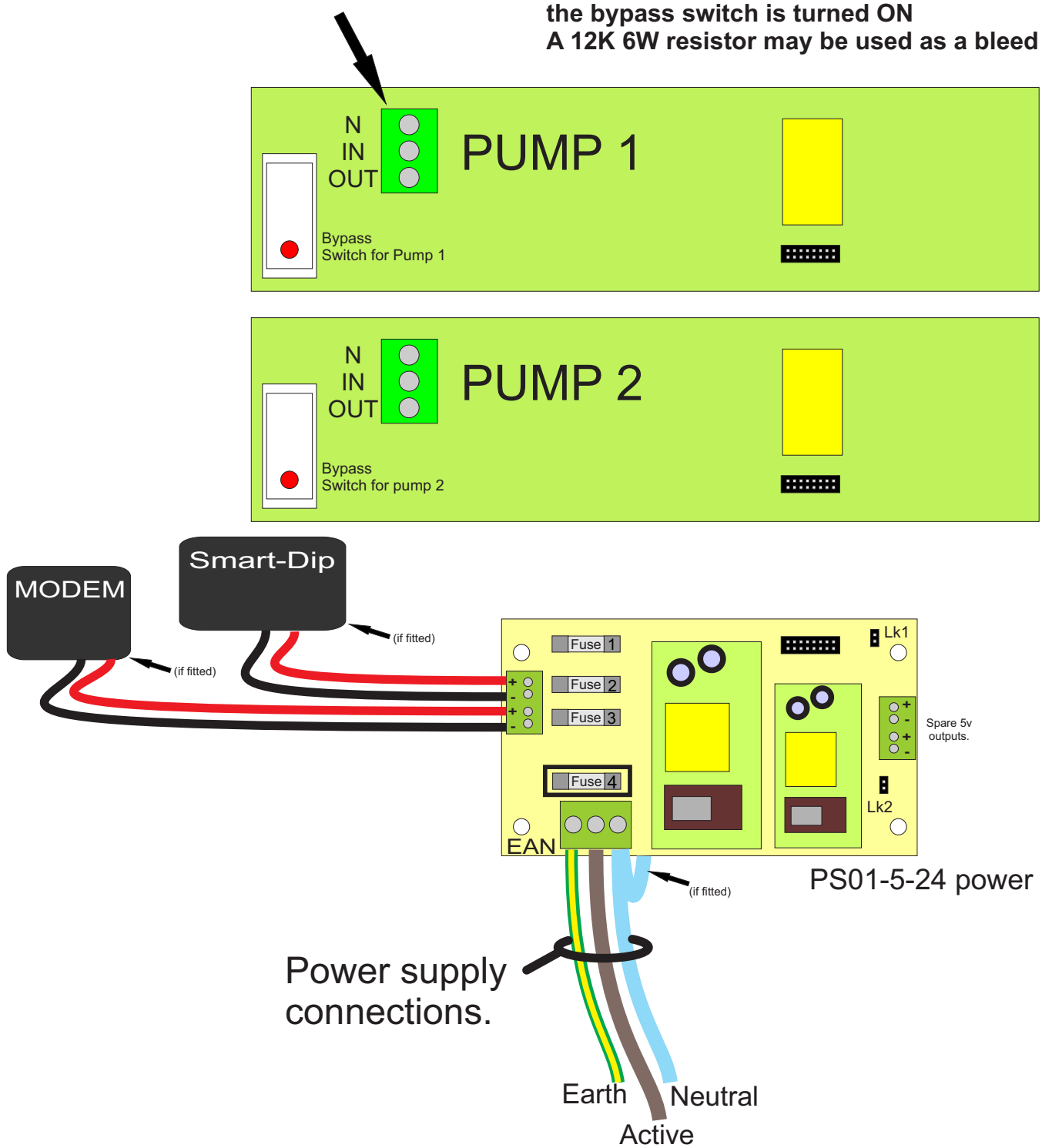


7.5 DC Wiring.

DC powered SmartFill systems have some options which make wiring of the system different depending on the particular application.

7.5.1 Acme NMI DC Single Flowmeter -SF1001.

Configuration options...

1. Single Outlet Only.
   Hose 1 relay contact only is used.

2. Dual Outlet (2 hose).
   Hose 1 and Hose 2 relay contacts are used to switch either a motorised valve, or 2 separate control valves etc.
   Duel outlet control must be turned On in the Mode setup.

3. Dual Outlet with separate pump switching.
   The relay contact in the Acme is used to operate a pump, and the relays on the SmartFill board are used to operate outlet control valves. This configuration allows the control valves to be set into position, and then after a short delay, the pump will start when the Acme is authorised by the SmartFill.

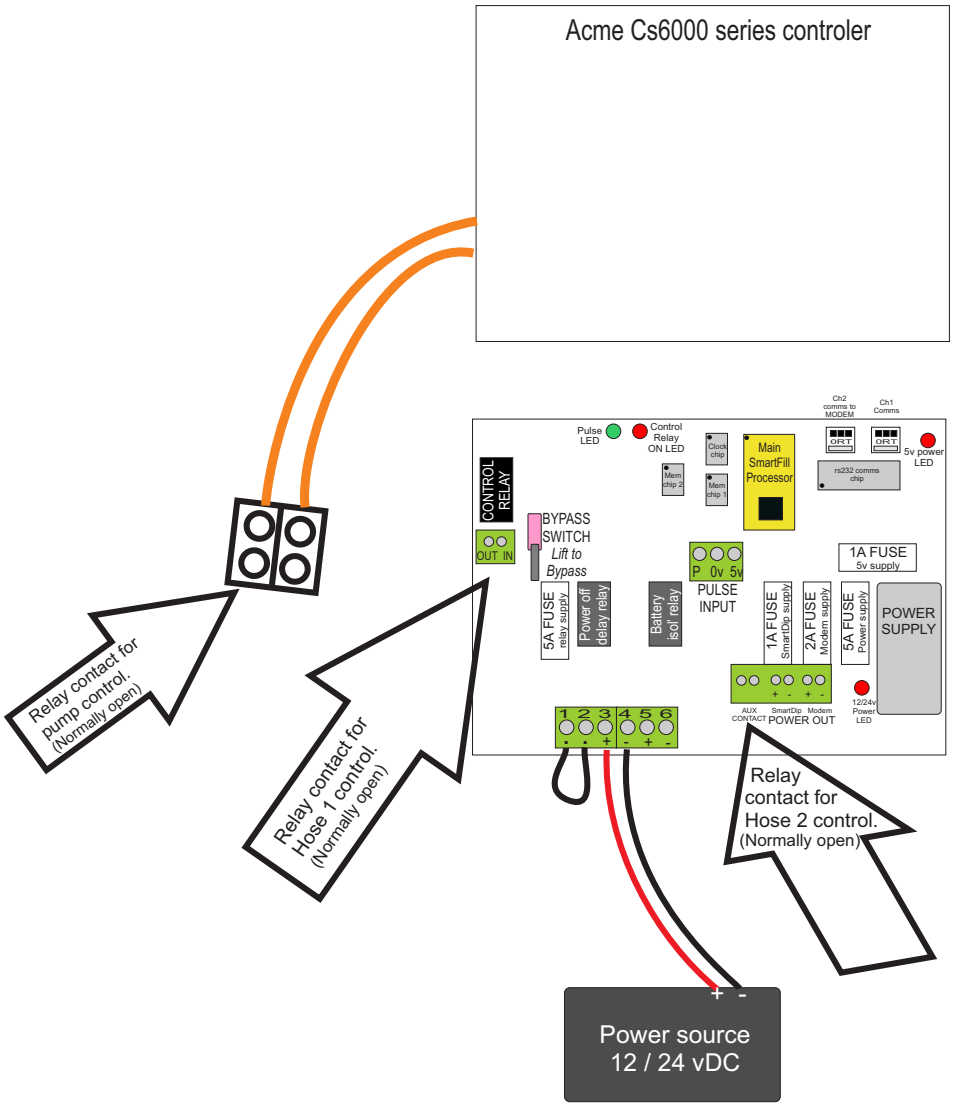


Figure 7: DC SmartFill with Acme CS6000.

7.5.2 Single Flowmeter - Single Hose DC -SF1010.

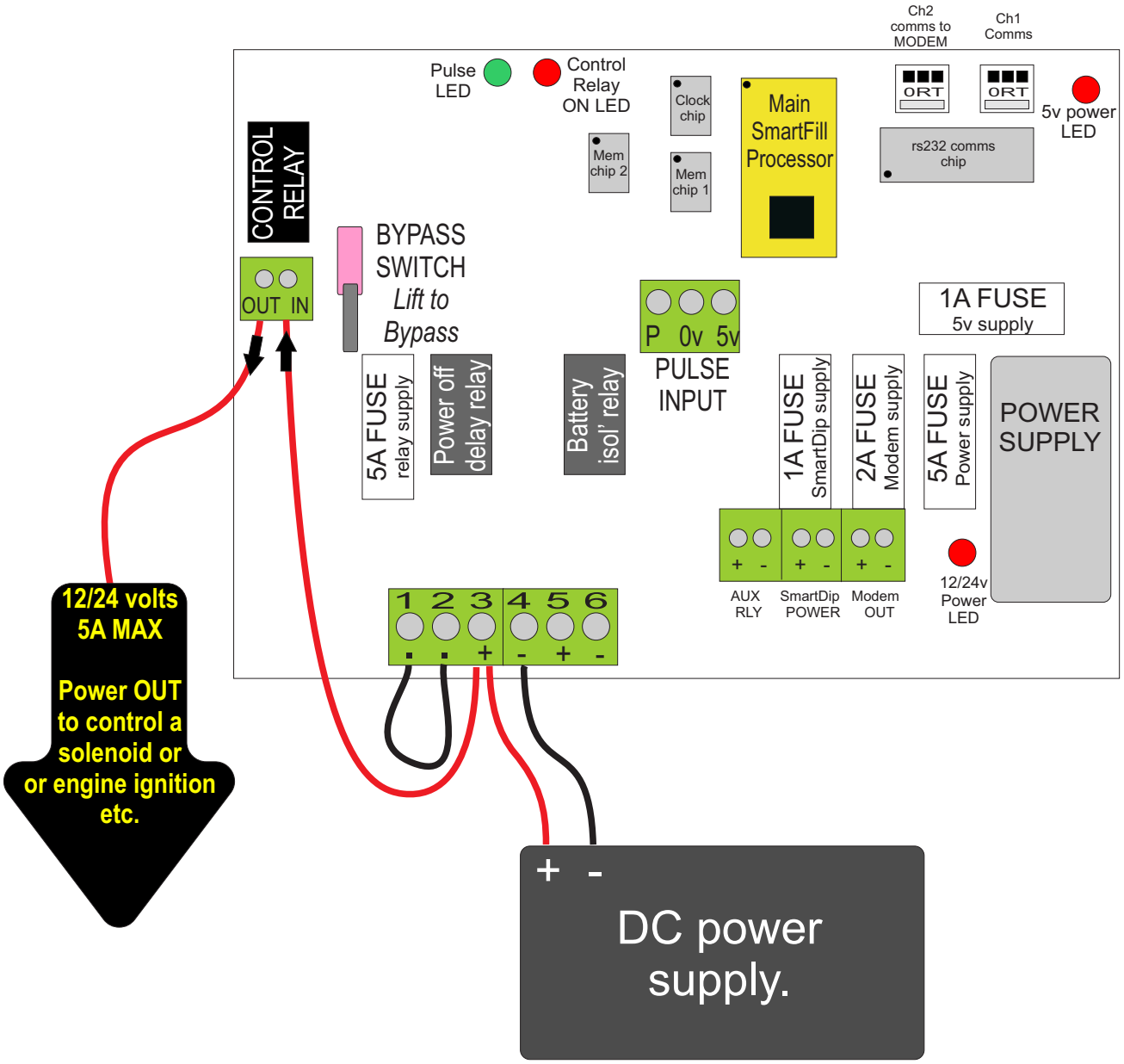


Figure 8: Single FM Single Hose DC -SF1010.

7.5.3 Single Flowmeter - Dual Hose DC - SF1010.

DC powered SmartFill systems (both NMI and NON NMI) are able to control 2 outlet hoses, while only connected to one flowmeter. While only allowing flow through one hose at a time, it provides the following benfits...

- Allows use of High and Low flow nozzles on separate outlets, as long as each outlet has a control valve fitted.
- Reduces cost of installation, requiring only one flowmeter.
- Prevents operators from using both nozzles simultaneously.
- Meets NMI requirements for single flowmeter / 2 hose configuration.

This option requires the 2 hose option to be turned on in the Mode setup.

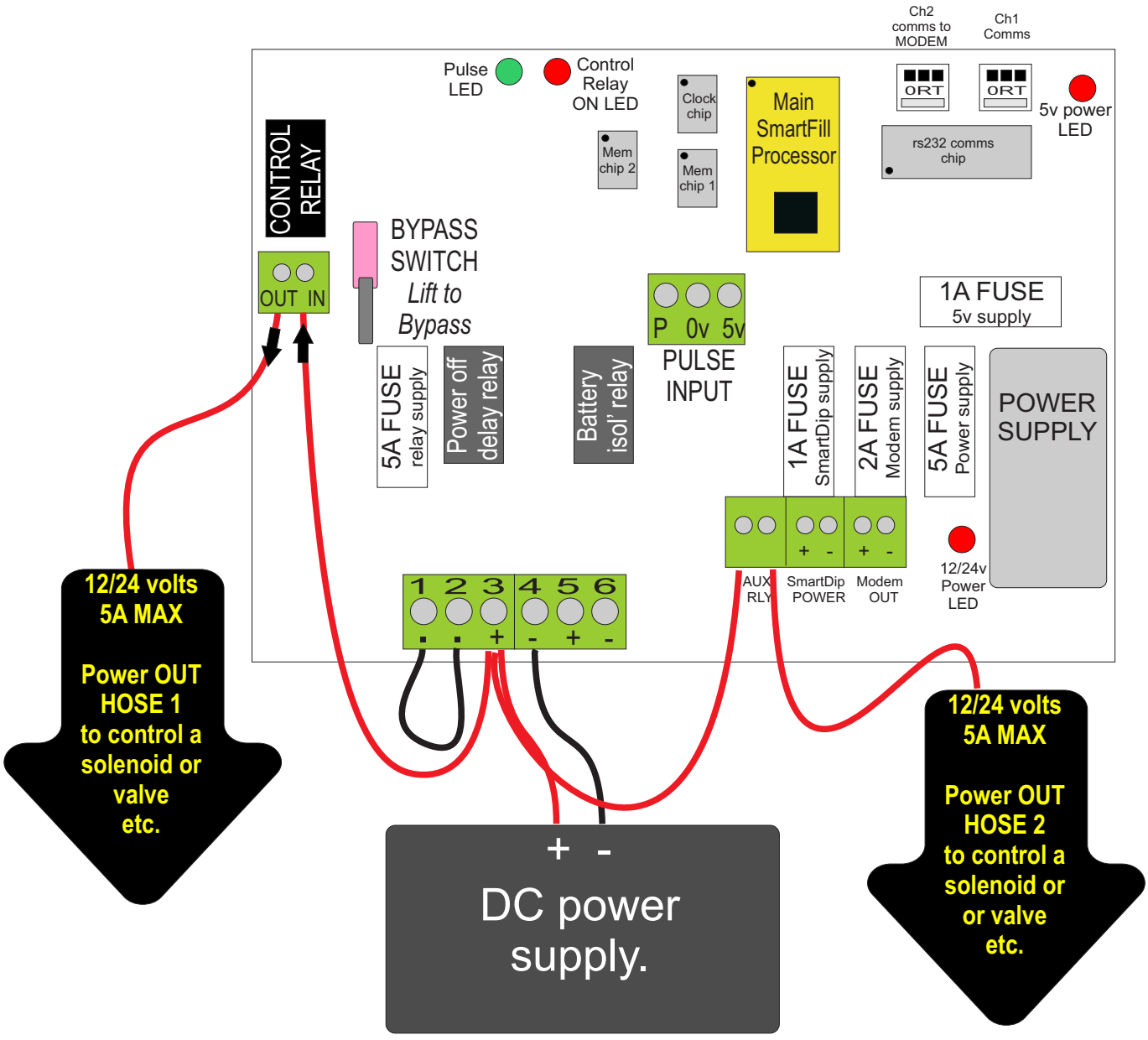


Figure 9: Single FM Dual Hose DC -SF1010.

7.6 DC System Special Options.

7.6.1 Auto Power Off.

NOTE- This option is applicable to DC powered systems only with "A1003", (rev09) or higher circuit board.
The Auto Power Off option has a number of benefits, suiting a few applications. Auto Off simply means that the SmartFill will power itself off completely, after a timeout period following a fuel delivery. This also requires the operator to power the SmartFill On via a push button on the front of the SmartFill.

If Auto Off is not used, simply fit a link across the push button switch input on the SmartFill processor board, and ensure that the option is turned off in the Mode Setup.

To activate "Auto Power Off" on a SmartFill...

1. Check that the SmartFill has a normally open switch fitted, either mounted into the front door on earlier versions, or on systems with a heavy duty LC Display bezel, use the centre (round) button for the power switch. You can source the correct cable/connector from the SmartFill Manufacturer, or fit a separate button as shown in the applicable diagrams.
2. Check that the power supply / pushbutton wiring is correct for this configuration.
3. Set the "Auto Power Off" option in the Mode setting.

7.6.2 Auto Power Off Wiring.

Correct wiring for Smart-Fill when connected to a 12v system, the main functions being...

1. Disconnect power to the Smart-Fill after a preset time following a fuel delivery, preventing the Smart-Fill from draining a vehicle or engine battery.
2. Reduce total daily power consumption so that solar power equipment costs can be minimised.

- The timeout period is adjustable in the SmartFill MENU from 1 to 59 Minutes. Normal setting 15 minutes.
- The timeout delay can be turned on/off in the Smart-Fill MODE setting option number 8192.
- If not using the delay timer, fit a link wire between terminals 1 and 2 where the switch normally goes.
- **WARNING FOR SOLAR POWERED SYSTEMS**... You must only charge the Vehicle / Engine battery, do not connect your solar charger to the Smart-Fill Battery.

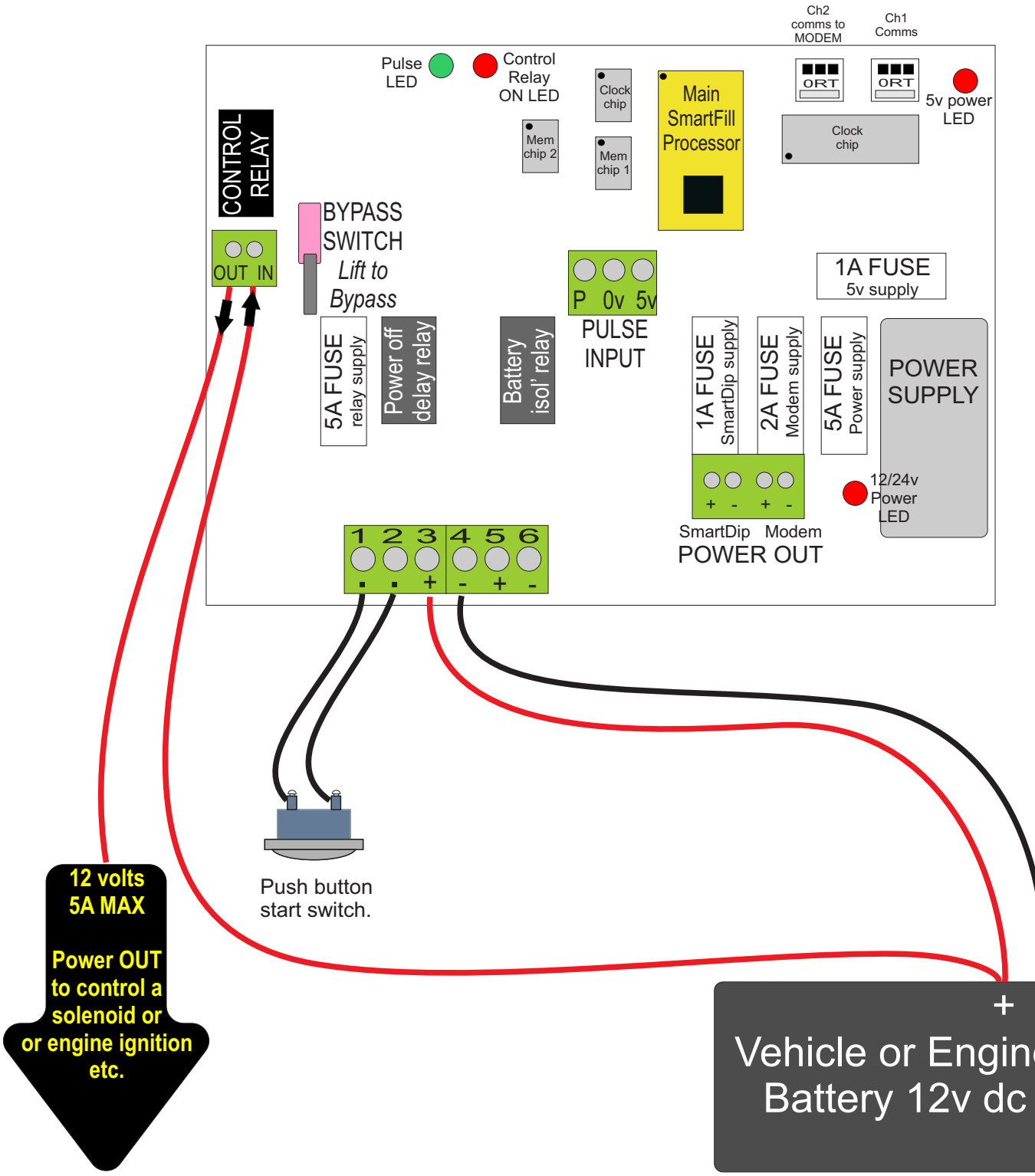


Figure 10: Auto Power Off usin start switch.

7.6.3 Battery Isolation Option on DC units.

The purpose of this option is to disconnect the SmartFill power supply completely from a battery which is also used to start an engine etc. This reduces the risk of electrical spikes affecting the SmartFill electronics when the engine is started.
This is usually only used in Solar Powered applications.
IMPORTANT- This requires strict operational procedures, where the SmartFill **MUST** be authorised **BEFORE** the engine is started.

In this configuration 2 supply batteries are required, one for the SmartFill, and one for the engine.

- When the system is idle, both batteries are connected together in parallel, and both are being charged by the solar supply.
- When the SmartFill is authorised, the SmartFill battery is disconnected from the engine battery. The SmartFill battery supplies the SmartFill only, the engine battery supplies the engine only. Now when the engine is started, there are no spikes etc on the SmartFill power circuit.
- When the fuel delivery is completed, the batteries are re-connected together, so that the SmartFill battery is again charged by the solar charging system.
- If Auto Power Off is activated, the system will still power itself off automatically.

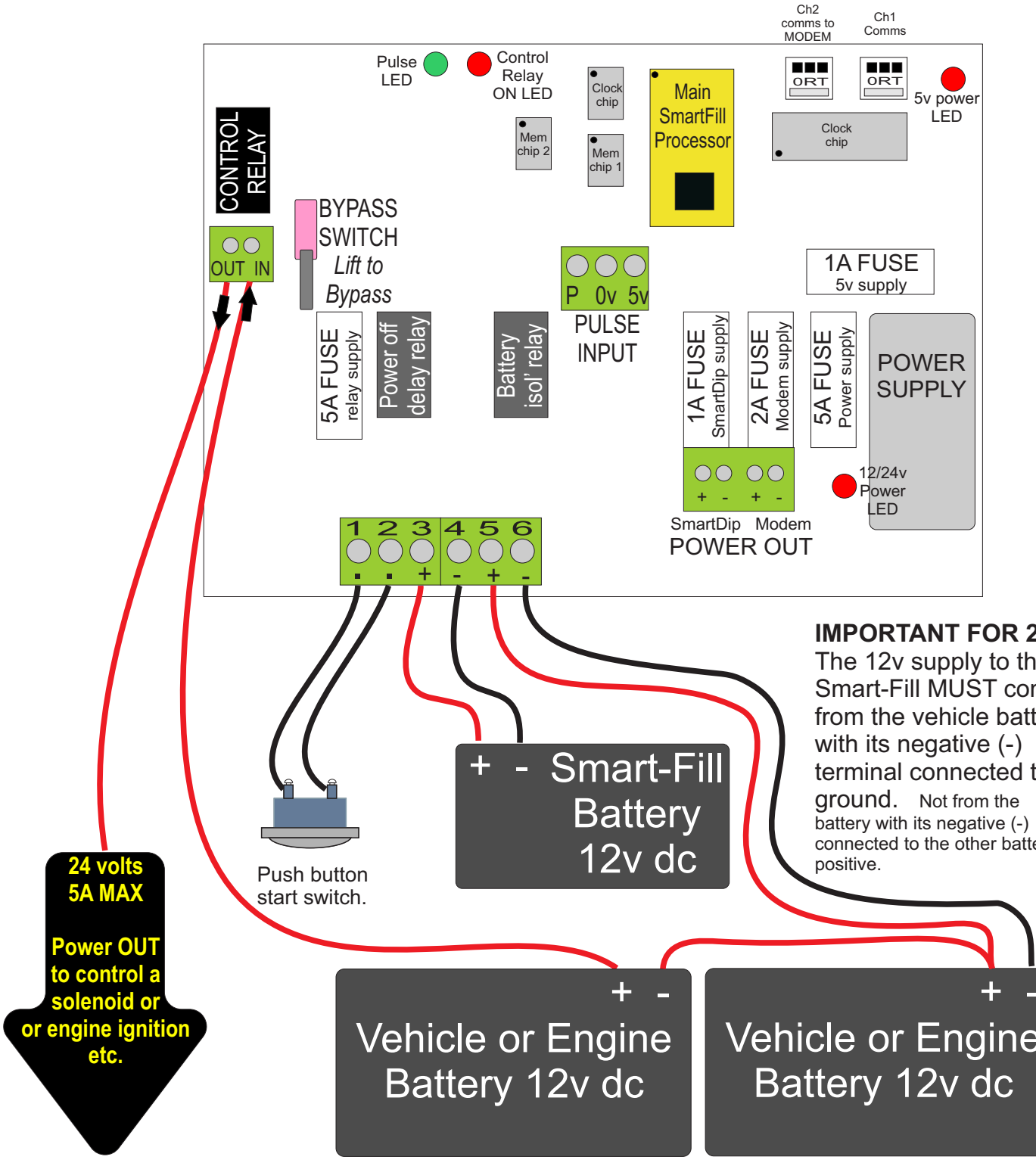


Figure 11: Battery Isolation -SF1010.

8 Pulser Installation.

8.1 Pulse input theory.

The SmartFill processor board measures fuel quantity by counting pulses from the flowmeter or a pulse transmitter, and converts these pulses to a quantity in Litres.
Some types of flow meter have a pulse output built in to them, and the flow meter sends out pulses at a set rate per Litre of fuel flow.
On other systems it may be required to install a pulse transmitter onto a rotating shaft etc, to convert the fuel flow into a pulse output. The SmartFill manufacturers make pulse transmitters to suit the most common flowmeter registers (mechanical bowser counters).
Pulse transmitters generally use 1 of 3 types of switching device to generate the pulses. They are listed below in order of preference.

Hall Effect Switch A small 3 pin device which outputs a pulse when a magnet passes. These are the preferable type of pulser, and have a very long life span, being a solid state device.

Reed Switch A small 2 pin device in a glass tube. The 2 contacts inside the tube come together when a magnet passes, creating a circuit. Reed switches can cause problems if the contacts 'bounce' or are dirty, and they do have a set life span.

Optical Switch A 4 or 5 pin slotted device which has an LED light source shining onto a receiver, and when the light path is broken by a slotted wheel etc, the receiver outputs a pulse. These pulsers will eventually fail in a dirty environment, so must only be used in dust free areas.

IMPORTANT It is best practice to use a Hall Effect type flowmeter / pulser wherever possible.

8.2 Pulser Application Chart.

Part No	Description	Hazardous Zone Approved	Suits Pump / Flowmeter Types	Reference Page
A1020	SmartFill Optical Pulser Kit	NO	Fill-Rite or similar style open frame 3 or 4 digit mechanical register.	25
A1024	SmartFill Hall Effect Pulser Kit	NO	Gilbarco T334 Fleetline, or any Pump fitted with a Veeder-Root 1623 Series Register	26
A1025	SmartFill Hall Effect Pulser Kit	NO	LC / FPP / TCS or any Flowmeter fitted with a Veeder-Root 7887 Series Register	27
P1478	Veeder-Root Pulser, Reed Switch 10 Pulses Per Revolution.	YES	May be retro-fitted to any rotating shaft output flow device.	28
A1031	Acme Pulser Modified with SmartFill Hall Effect Output	YES	LC Flowmeter to NON NMI Applications only. Best for use on Service Truck etc.	29

Table 1: Pulser Application Chart

8.3 A1020 SmartFill Fill-Rite Pulser Kit.

Specifications.

- NOT for use in Flammable / Hazardous Zones.
- Supply Voltage - 5v DC.
- Output type - Hall Effect, Square Wave 0-5vdc.
- WARNING ⚠ Do not overtighten the mounting nut (if fitted), as board damage / short circuit may occur.

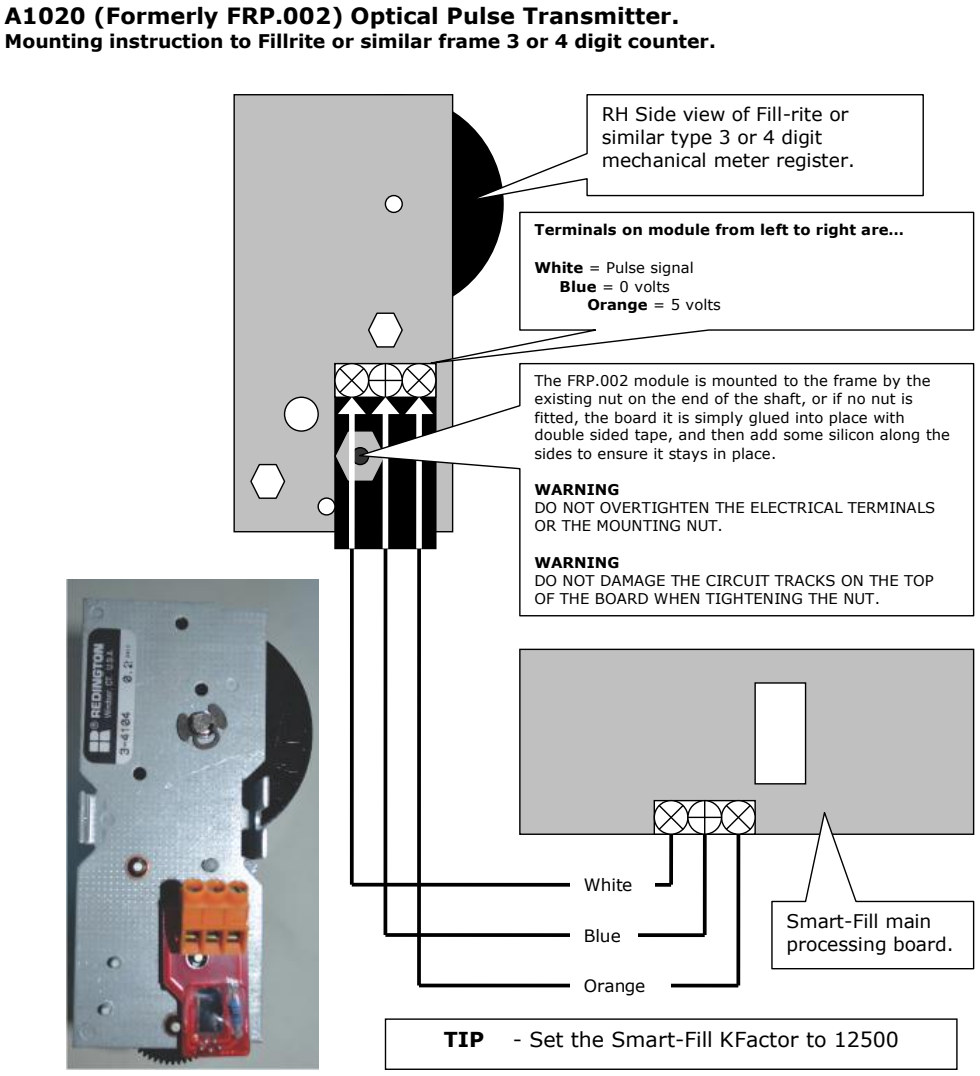


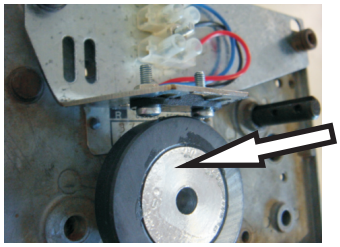
Figure 12: A1020 Pulser Installation.

8.4 A1024 SmartFill "Fleetline T334 Gilbarco" Pulser Kit.

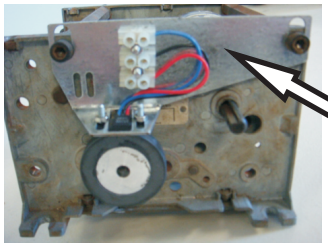
Specifications.

- NOT for use in Flammable / Hazardous Zones.
- Supply Voltage - 5v DC.
- Output type - Hall Effect, Square Wave 0-5vdc.

Installation instructions for Smart-Fill
part No A1024 pulse generator kit to suit
Veeder Root 1623 series meter register.

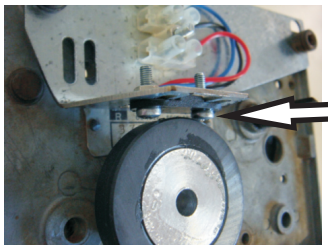


1- Install the wheel onto the input shaft.
- Push the wheel onto the input shaft.
- Tighten the grub screw firmly, requires 3/32" hex key.(Allen key).
- Check that the wheel will not slip / turn on the shaft.



2- Install the sensor plate onto the register body.
- Remove the top cross brace bolts and fit the sensor plate.

NOTE - You may need to move the wheel left - right slightly to achieve perfect alignment.



3- Adjust the air gap between the wheel and sensor.
- Gently bend the metal plate up / down to achieve an air gap of 2 mm.
- Slowly rotate shaft and check that the screw heads do not rub against the wheel.

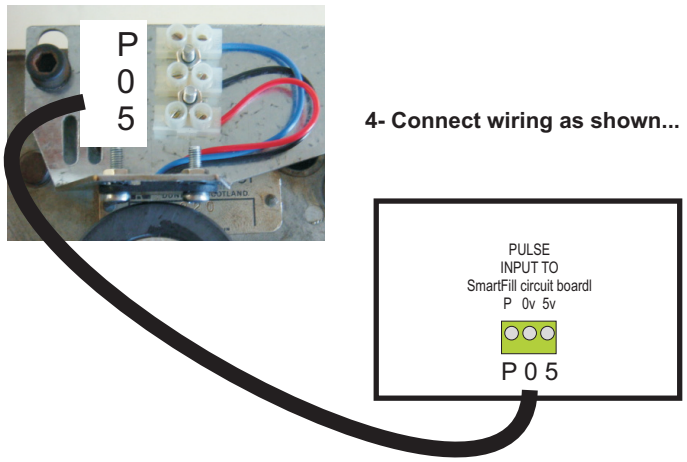


Figure 13: A1024 Pulser Installation.

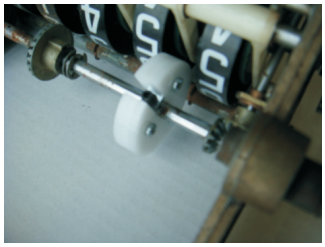
8.5 A1025 SmartFill "7887 Register" Pulser Kit.

Specifications.

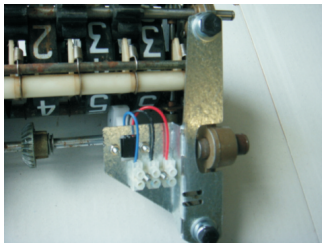
- NOT for use in Flammable / Hazardous Zones.
- Supply Voltage - 5v DC.
- Output type - Hall Effect, Square Wave 0-5vdc.

Installation instructions for Smart-Fill part No A1025 pulse generator kit to suit Veeder Root 7887 series meter register.

It is recommended to remove the counter assembly from the register housing to install the pulser kit. This will enable you to clearly see the air gap between the pulse wheel and underneath the sensor plate.



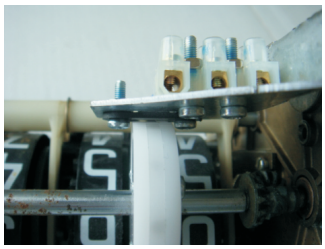
1- Install the wheel onto the input shaft.
- Remove the screw / nut assy from the wheel, then push the wheel over the shaft.
- Slide the screw / nut assy into the small slot, ensure it is centred correctly.
- Tension the screw firmly, but do not overtighten.
- Test that the wheel will not slip on the shaft.



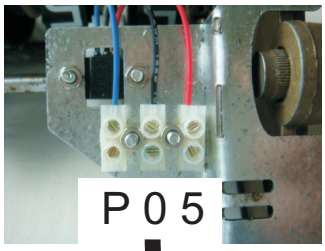
2- Install the sensor plate onto the register body.
- Fit the plate as shown at left, using the bolts and washers supplied in the kit.
- Adjust the plate left - right so that the sensor aligns with the wheel.

NOTE - You may need to move the wheel left - right slightly as well to achieve perfect alignment.

- Tighten mounting bolts.



3- Adjust the air gap between the wheel and sensor.
- Gently bend the metal plate up / down to achieve an air gap of between 1 and 2 mm.
- Slowly rotate shaft and check that the screw heads do not rub against the wheel.



4- Connect wiring as shown...

NOTE-
Smart-Fill Kfactor MUST be set to 25000.

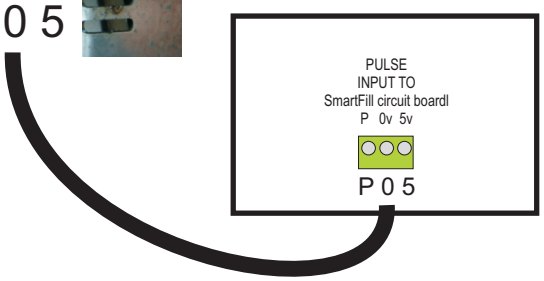


Figure 14: A1025 Pulser Installation.

8.6 P1478 Veeder Root 10 PPR Pulser.

Specifications.

- For use in Flammable / Hazardous Zones.
- Switch type - Reed Switch.

Smart-Fill pulser wiring with VR 10 ppr pulser unit.

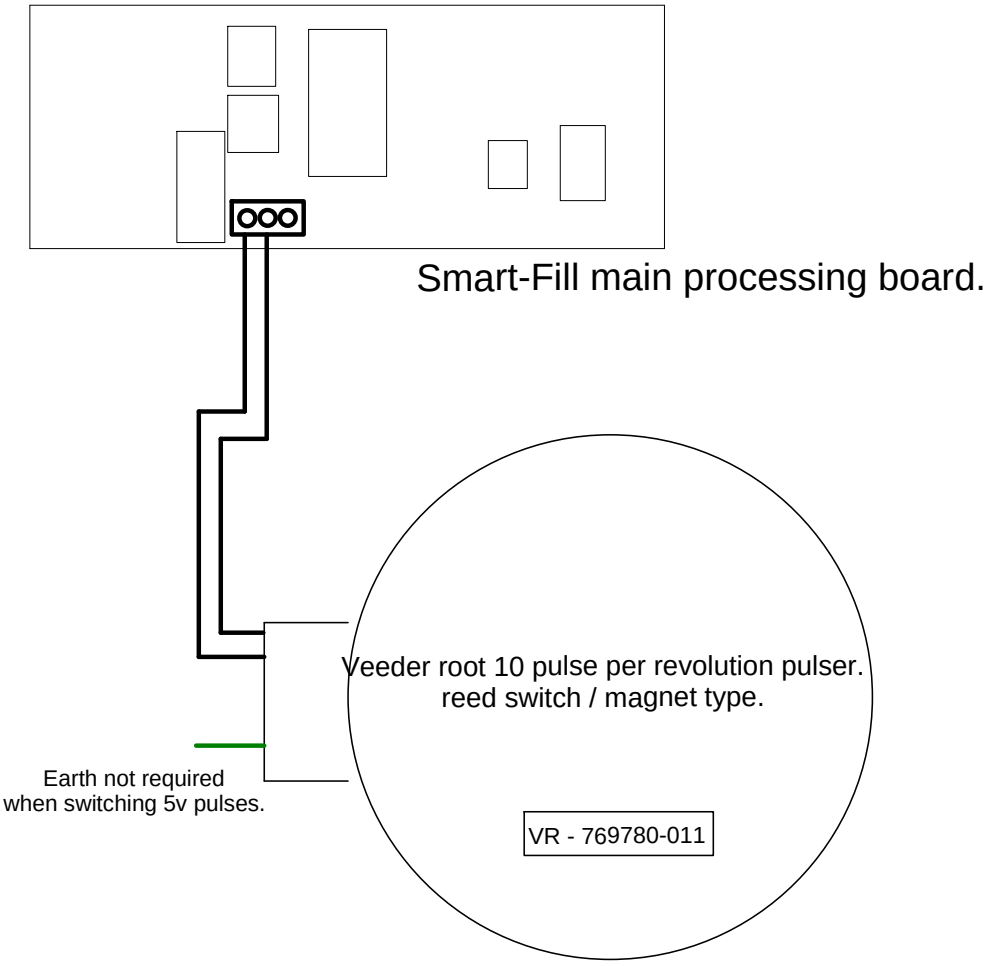


Figure 15: P1478 VR 10PPR Pulser Installation.

8.7 A1031 SmartFill Acme Pulser.

Specifications.

- For use generally on Service Vehicles.
- Supply voltage 5v DC.
- Switch type - Hall Effect.

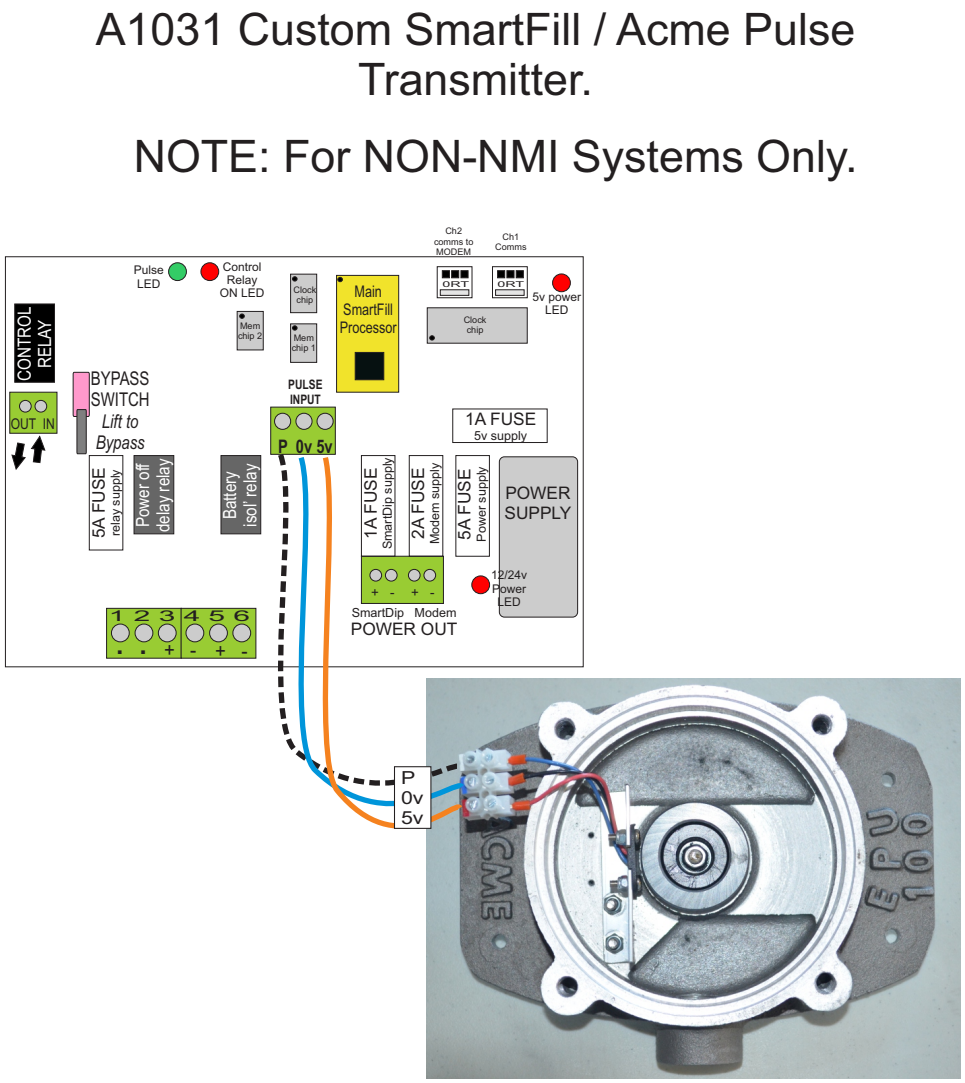


Figure 16: A1031 Custom LC / Acme Pulser.

8.8 Acme EPU 100 / 200 Pulser.

Specifications.

- Supply voltage 8v DC (Set in Acme CS6000).
- Switch type - Namur Proximity Sensor.

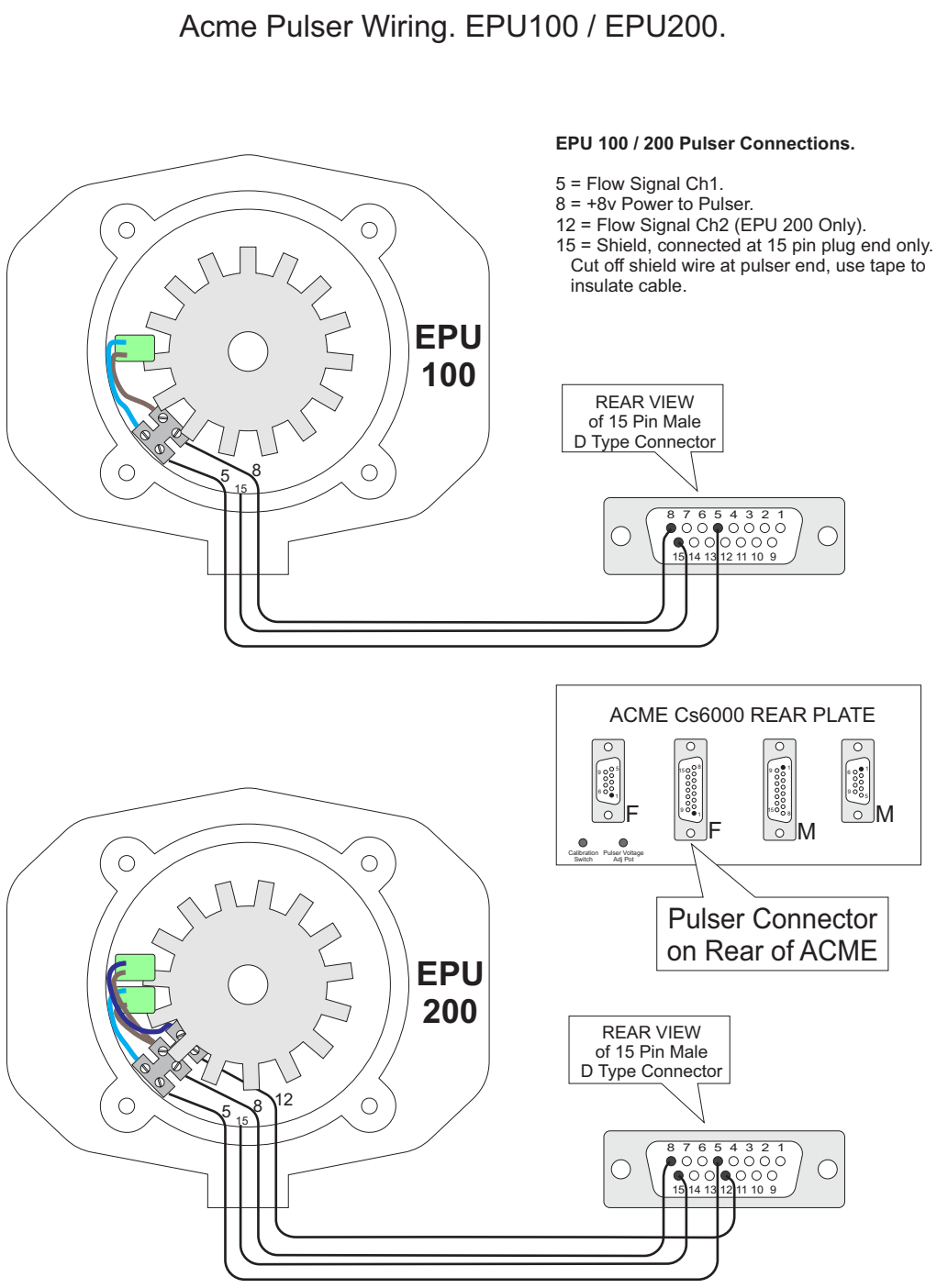


Figure 17: Acme EPU100 / EPU200 Wiring.

9 Calibration.

9.1 Standard SmartFill Calibration (Non NMI ONLY).

- The Smart-Fill counts the number of pulses received while delivering fluid, and converts the number of pulses to a volume in Litres as each pulse is received. The method of adjusting the calibration is known as a 'Kfactor'.
- Adjusting the Kfactor value upwards makes the Smart-Fill read higher compared to the amount of fluid dispensed.
- An access code is required to change the K factor, the access code is written as the "ID number" on the MENU key for the Smart-Fill, the number is different on all systems.
- You can use a known size measuring container (known simply as a measure, and usually say 15, 100 or 200 Litres in size), or you can use the display on the meter or dispenser if fitted.
- The calibration of the unit is a fairly simple procedure. Depending on the number of pulses per litre, the Kfactor may be adjusted from 1 to 65000.
- The measuring vessel size or amount delivered should be as large as possible.
- It is preferred to use a minimum 200 Litre measuring vessel for High Flow diesel dispensing pumps.

1. **If you have a known size measuring container.**
   (a) Accurately fill the measuring container.
   (b) Look at the Smart-Fill display and note the Litres recorded.
2. **If you have a display on the dispenser/meter.**
   Before adjusting the Smart-Fill K factor by using the display on a dispenser or meter, the meter should be calibrated with a measure to ensure that it is delivering the amount actually shown.
   (a) Fill a container or vehicle fuel tank.
   (b) Record the Litres recorded on both the Smart-Fill and the dispenser.
   (c) The formula for calculating the new K factor is: **Existing K factor / Litres shown on Smart-Fill * Litres delivered.**
   Eg:
   The existing K factor is 1000.
   The Litres recorded by the Smart-Fill was 15.2 Litres
   The delivered amount was exactly 15.0 Litres.
   New K factor = 1000 / 15.2 * 15.0 = 986.8 (round it up to 987).
3. To view the existing K factor on a Smart-Fill, just go into the Menu and 'View Settings' or press 6 on the keypad as a shortcut.
4. To change the Kfactor.
   (a) Touch the MENU key to sensors to start the menu system.
   (b) When "Cal" or "Calibrate" appears, press ENTer.
   (c) Enter the access code (ID number on MENU key tag), and press ENTer.
   (d) Enter the required K factor and press ENTer.
   (e) For multiple pumps only. Enter the pump number, then press ENTer.
   (f) Repeat the process until measurement is consistently accurate.
5. **IMPORTANT** – As stated above, a large delivery of fluid creates a more accurate calibration. calibrating with a small delivery of fluid can result in substantial accuracy errors. The recommended minimum calibration quantity, is the quantity delivered at full flow for at least 1 minute.

9.1.1 Suggested Initial Kfactors.

To assist in speeding up some installations, please see listed below some suggested initial starting Kfactors. NOTE- These only apply to version 9 NON NMI SmartFill systems.

If you know the number of pulses per Litre output by a pulser or flowmeter, you can easily calculate an initial Kfactor prior to checking actual calibration.
The formula is... Kfactor = 25000 / Pulses per Litre.

The meter calibration must still be checked and adjusted as necessary, the following information is a guide only.

Pulser / Flowmeter Type	Pulses per Litre	Initial Kfactor
A1020 SmartFill Fill-Rite Style	20	12500
A1024 SmartFill VR1623 (Fleetline etc)	10	2500
A1025 SmartFill VR7887	1	25000
Flomec / Trimec 25mm Reed SW	27	926
Flomec / Trimec 25mm Hall Effect	107	234
Flomec / Trimec 40mm Reed SW	13	1923
Flomec / Trimec 40mm Hall Effect	52.6	476
Flomec / Trimec 50mm Reed SW	6.465	3867
Flomec / Trimec 50mm Hall Effect	12.93	1934
Flomec / Trimec 80mm Reed SW	2.32	10776
Flomec / Trimec 80mm Hall Effect	9.3	2688
MacNaught M10 25mm	36	695
MacNaught M40 40mm	14.5	1724
MacNaught M50 50mm	6.68	3742
MacNaught M80 80mm	2.59	9653
MacNaught M100 100mm	2.315	1080

Table 2: Suggested Initial Kfactors.

9.2 NMI (Acme CS6000) Calibration.

- The Acme CS6000 built into NMI approved SmartFill systems, has its own calibration setting, known as 'Scale', which is simply another name for Kfactor.
- The SmartFill does not require calibration when an Acme CS6000 is fitted.
- The Acme Kfactor (scale) is simply the number of pulses per Litre being output by the flowmeter. So if the PPL of the flowmeter is 21.1, then the Acme scale is set to 21.1.
- The formula for adjusting the Acme Scale when calibrating is different to the SmartFill formula.
  Existing Scale * Litres shown on Acme Display / Litres delivered.
  Eg:
  The existing Scale is 21.2.
  The Litres recorded by the Acme was 200.4 Litres
  The delivered amount was exactly 200.0 Litres.
  New Scale = 21.2 * 200.4 / 200.0 = 21.2424.

9.2.1 Calibration Procedure.

This is a very simple procedure if you follow the instructions here step by step.

1. Remove the sealing screw on the rear of the ACME CS6000 so that you can access the calibration push button switch. (It is on the lower left corner when viewed from the rear).
   WARNING
    DO NOT USE A METAL OBJECT WHEN PUSHING THE SWITCH, AND PUSH GENTLY.
2. Gently press the calibration switch (CAL switch) in the ACME CS6000 to enter the calibration routine. The ACME CS6000 will show **CAL**.
3. Press the Print/Stop button to step through the options, until **SCALE** appears on the display.
4. If you press the Print/Stop button again, the whole numbers of the Scale will be shown.
   (a) Write this down to the left of a decimal point. Eg 12. 5.
   (b) Press the Print/Stop button again to see the fractional numbers.
   (c) Write these down to the right of the decimal point. Eg 2340.
   (d) You now have recorded 12.2340 as the existing kfactor.
5. Keep pressing the CAL switch until END appears on the Acme display, then press it once more to exit the calibration routine.
6. Run fuel calibration test measures.
7. Use the formula quoted above to adjust the Scale value as required.
8. If you now need to adjust the Scale in the ACME CS6000.
   (a) Press the calibration switch (CAL switch) in the ACME to enter the calibration routine. The ACME CS6000 will show CAL
   (b) Press the Print/Stop button to move through the options, until SCALE appears on the display.
   (c) If you press the Print/Stop button again, the whole numbers of the Kfactor (or calibration adjustment) will be shown. Adjust whole numbers if necessary by using the 2 left buttons to scroll through or change the setting.
   (d) Press the Print/Stop button again to see the fractional numbers.
   (e) Adjust fractional numbers if necessary by using the 2 left buttons to scroll through or change the setting.
9. Run fuel measures again and check / adjust the Kfactor again if necessary.
10. Record the Scale value, and properly seal the CS6000 calibration screw.

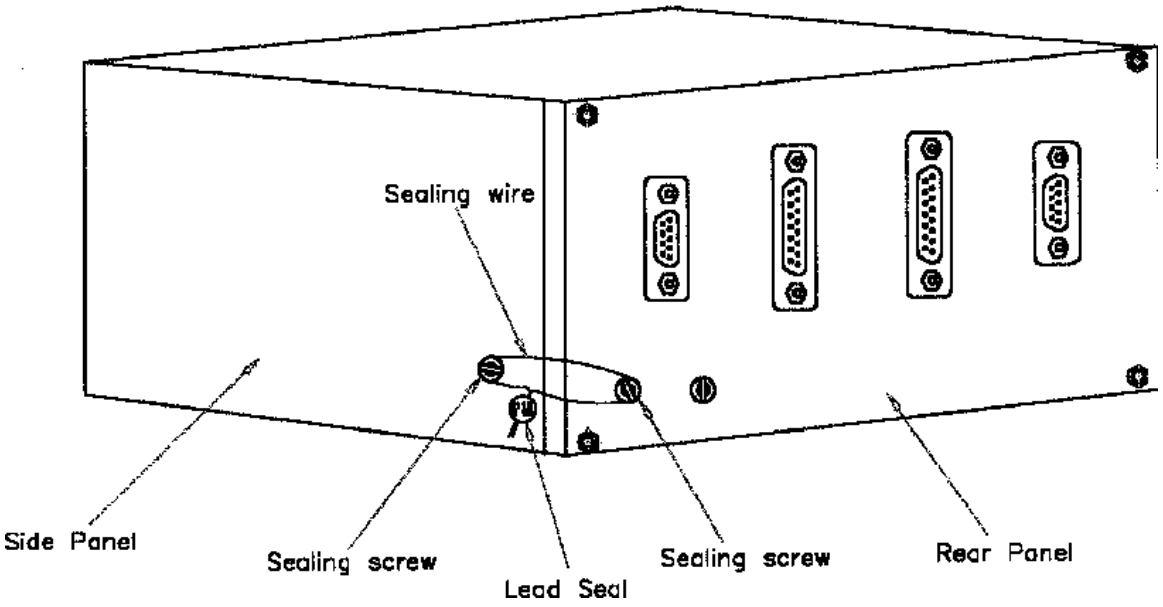


Figure 18: Acme CS6000 Calibration / Sealing Access.

9.2.2 Other Acme Settings.

There are many other settings in the Acme unit, to suit a large number of applications / flowmeter types etc.

WARNING

DO NOT adjust any of the other Acme settings without first consulting the SmartFill manufacturer. Some of the settings are crucial and can have various negative affects on performance if set incorrectly.

10 Gilbarco Comms SmartFill SF1002 / SF1005 .

10.1 Data Cabling.

- The data cable used for Gilbarco comms purposes is ideally a twisted / shielded pair. The shielding is grounded at the SmartFill end, and left unconnected at the Dispenser end.
- Data cabling should be run separate to mains cabling.
- All cable ends MUST be insulated where insulation has been removed, to prevent shield wiring etc from contacting any circuit board or metal parts.
- Bootlace ferrules must be used on all data connections.

10.2 Wiring schematic.

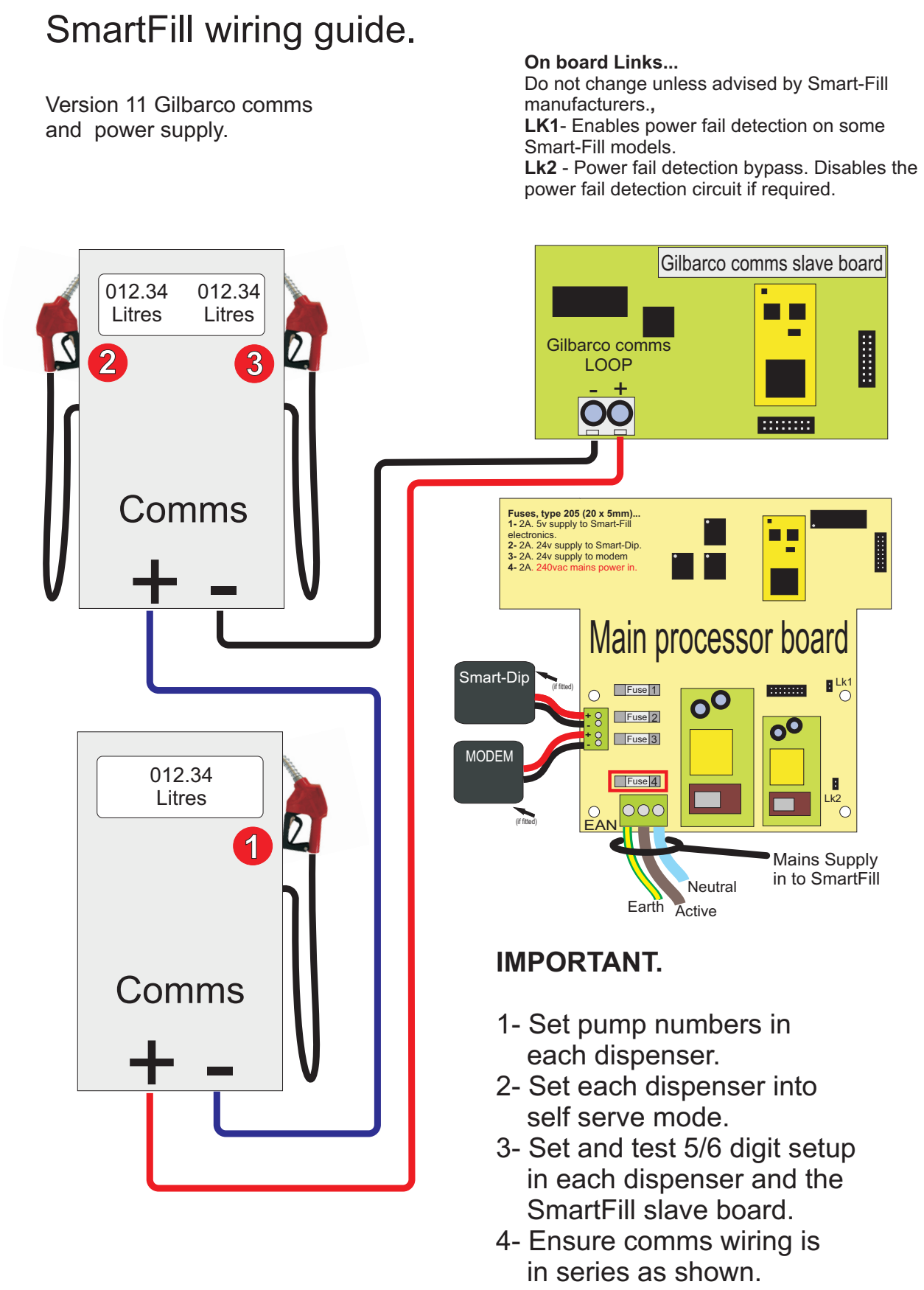


Figure 19: SmartFill v11 Wiring diagram.

10.3 Gilbarco comms basics.

- The Gilbarco communications standard is a series communication loop which is powered by the controller, ie: the SmartFill.
- The SmartFill can control up to 8 pumps with GB comms.
- Pumps can be turned on / off in the SmartFill menu.

10.3.1 SmartFill GB comms circuit board types.

Early type circuit board uses dip switches on rh side for pump number setup.
LK3 setup clip is located at the bottom of the board, just to the left of the ribbon cable.

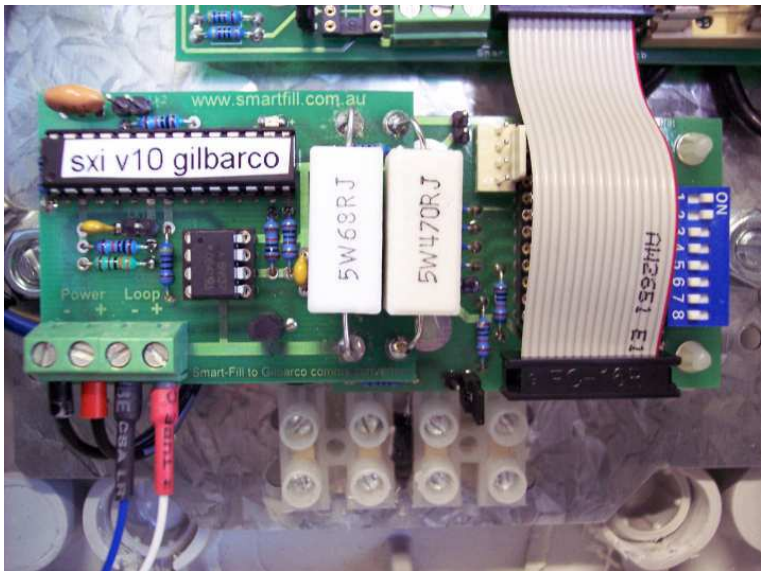


Figure 20: Early version 11 GB comms slave board.

Current type circuit board uses link clips on rh side for pump number setup.
LK3 setup clip is located to the left of the processor, the bottom 2 pins in the group of 4.

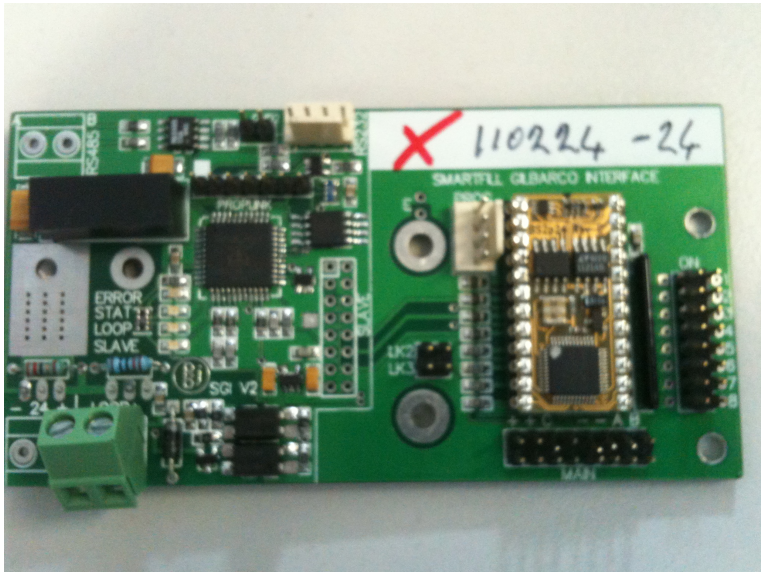


Figure 21: Current version 11 GB comms slave board.

10.4 5 / 6 Digit purpose and setup.

- The 5 /6 digit setting is a part of the Gilbarco comms system. In earlier model pumps only 5 digit was available. To allow larger fuel deliveries, the 6 digit setup was introduced.
  Some fuel dispensers are fixed at 5 digit, some at 6 digit, and some are able to be set to 5 or 6 on the pump. Contact the pump manufacturer (not the SmartFill manufacturer) to confirm the arrangement on a specific pump.
- All SmartFill systems are able to be changed from 5 to 6 digit. Even on multiple hose systems, each individual hose (pump) can be set as 5 or 6 digit. This allows you to mix both on one site.
- When a pump transmits its Litres data to the Smart-Fill, the decimal point position in the Litres is different with 5 and 6 digit formats. A dispenser set up as 5 digit Litres, can only transmit a maximum of 999.99 Litres to the SmartFill, wheres as 6 digit setup can transmit 9999.99 Litres.
- If the setup on the SmartFill board is incorrect, this will result in the Smart-Fill incorrectly reading the Litres data from the pump, ie: the decimal point will be in the wrong place.
- WARNING - Some dispensers will show 6 digits on the display, even when set in 5 digit mode. This results in a fuel delivery of over 1000 Litres losing the 'thousands', which is a serious problem.
- When it is possible, both the SmartFill and the pump MUST both be set to 6 digit mode.
- The SmartFill must only be set to 5 digit mode when a pump is locked on 5 digit.
  In this situation, the SmartFill MUST have its maximum delivery amount set to 950 Litres to prevent the loss of data. It is recommended to set the maximum delivery to 950 Litres on any system using Gilbarco comms.
- IMPORTANT.
  The SmartFill manufacturers can not provide information on the 5 / 6 digit setup procedures for fuel dispensers. This information must be sourced from the pump supplier / manuafacturer.
- The 5 / 6 digit setting can be set on the SmartFill.
  - Earlier version 10 (single hose only) systems are set via the MODE setting in the SmartFill.
    A mode value of 0 = 6 digit, or 16 = 5 digit.
  - Version 11 (multi hose) systems are set via a procedure on the SmartFill slave circuit board.

10.4.1 5 / 6 digit Litres setup procedure.

- Turn the power OFF.
- Fit the link clip onto the 2 pins of LK3 on the slave board.
- Set the link clips for each pump to 5 or 6 digit.
  - Link clip ON = 6 Digit, 1234.56 Litres.
  - Link Clip OFF = 5 Digit, 123.45 Litres.
- Turn the power ON for 20 seconds.
- Turn the power OFF.
- Remove the LK3 link clip, place it back on one pin only.
- Set each link clip back to its original pump number position.
- Turn the power ON.
- Run a test delivery on each pump, and then after the SmartFill has saved the delivery and reset, press 1 on the SmartFill keypad to view the last delivery.
- Check that each pump setup is correct.
- Repeat the check for each pump.
  NOTE. On some pumps, the display will show 6 digits, but the pump will only communicate 5 digits. The only way to test this is to do a test delivery of over 1000 Litres. If you can not run a test of over 1000 Litres, it is advised that you set everything to 6 digit where possible, and limit the maximum delivery to 950 Litres for Gilbarco comms pumps.

10.5 Gilbarco comms test procedure.

HIGH VOLTAGE WARNING.

These checks must only be carried out by a suitably licensed and qualified electrician when there are mains voltages present.

This information is a basic test procedure for Gilbarco communications. This will simply tell you if there is current flow in the comms loop, and also if there is correct approximate voltage drop across the pumps in the loop.

10.5.1 Comms loop current check.

The current flowing through the comms loop can be tested by using a digital multi-meter in dc milliamps mode.

1. Power the system off.
2. Disconnect the + comms wire from the SmartFill board.
3. Put the multimeter in DC Milliamps mode, in series with the loop.

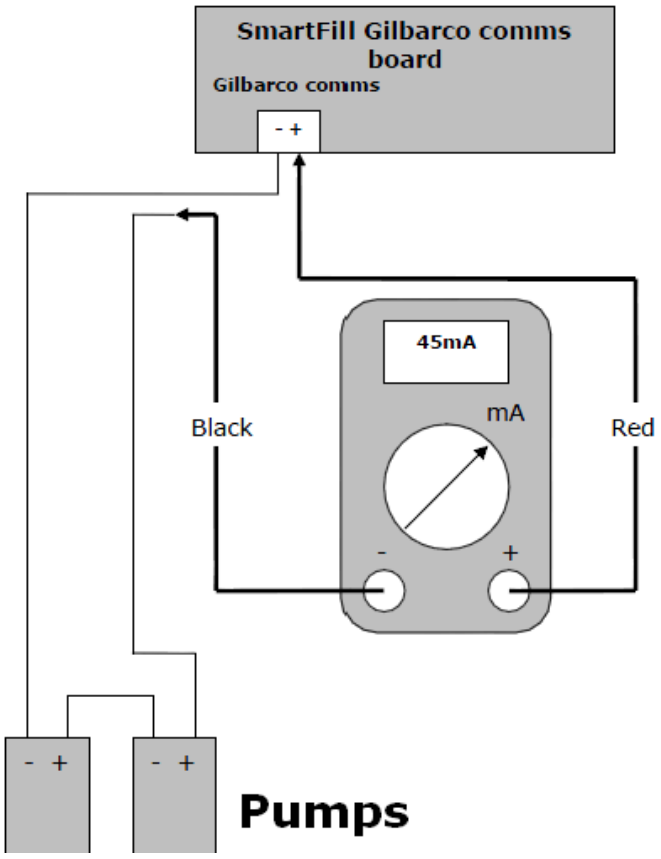


Figure 22: Multimeter set up to measure dc milliamps in the comms loop.

4. Power the system on, and measure the current flowing in the circuit.
   (a) 45 milliamps is an ideal reading, but a range between 40 and 50 milliamps should still be ok.
   (b) Over 50 milliamps would indicate a fault in the SmartFill board, as this supplies the current for the circuit. You should replace the SmartFill slave board.
   (c) Below 40 milliamps would indicate a high resistance in the loop, or an open circuit. This could be caused by either a wiring issue, a faulty SmartFill slave board, or a faulty dispenser.
      i. Disconnect the comms loop from the slave board, and connect the multimeter directly across the + and - terminals. If you now have 45mA, then the cable is faulty. If it is below 40mA, then the slave board is faulty, and should be replaced.
      ii. Run a temporary comms data cable to each dispenser, to check the cabling. You can also run a cable to each dispenser individually to test each one.

10.5.2 Comms loop voltage drop check.

A very simple check is to measure the DC voltage drop over the comms loop.

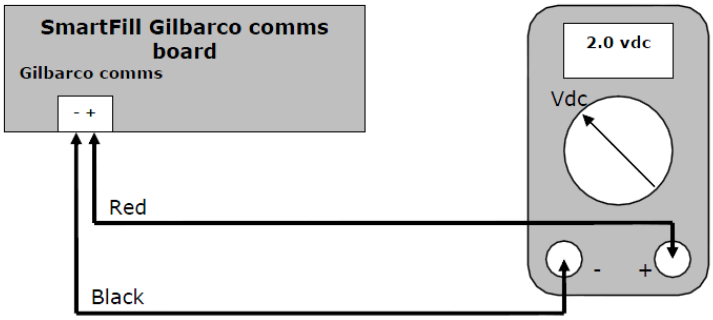


Figure 23: Multimeter set up to measure voltage drop over the comms loop.

With the loop disconnected from the SmartFill board, you should have a reading of approx 24 volts across the + and - terminals on the slave board.

With the loop connected, you should see a reading of approx 1.5 to 2 volts, for each pump on the loop. So if you have 3 pumps on the loop, a reading of say 4.5 to 7 volts would be acceptable.

10.5.3 Troubleshooting.

There are some common faults which can be encountered when installing a SmartFill with Gilbarco comms. Please thoroughly check each of the items below before consulting the SmartFill or Pump manufacturers for assistance.

PLEASE remember, the SmartFill manufacturers can NOT provide technical advice on fuel dispensers, or there setup processes etc. You must consult the pump manufacturers for specific pump advice.

Check off each item below as you test the system.

- No communication, Comms fault, or ER showing on the SmartFill display.
  - Check that the pump numbers in the dispenser are set correctly.
  - Check that pumps are set to self serve mode, not stand alone.
  - Check wiring, and ensure that the comms loop is connected correctly.
  - Check the loop current, and voltage drop readings, see section 10.5.
  - Try a power reset (Power off for 30 seconds) of both the SmartFill and the dispenser. Do this with the dispenser nozzles hung up. Make sure you wait the full 30 seconds to ensure that the power is completely off. Also check the SmartFill display to check that the power has actually gone off.
  - Check that the link clips / dip switches on the slave board RHS, are ON for each pump on the loop.
  - Check that the Power fail link on the power supply is clipped onto the 2 pins.
- Litres reading incorrectly, ie: Decimal point is in the wrong place in the Litres shown on the SmartFill.
  - This is simply the 5 / 6 digit setup in the dispenser and the SmartFill. Refer to section 10.4.

11 Operation and Setup of the SmartFill.

11.1 Using the System to Take Fuel.

1. The driver touches the vehicle ID key (button) onto the sensors on the Smart-Fill unit. This key identifies the vehicle to the Smart-Fill.
2. The Smart-Fill searches its memory, and checks if the key is authorized. If the vehicle key is not authorized, the pump won't start, and the display will show 'Key Not Valid'.
3. If the following options are turned on in the MODE setup...
   (a) The Smart-Fill requests the Speedo / hour meter reading. The driver enters this into the Smart-Fill keypad.
   (b) The Smart-Fill requests the PIN number. The driver enters this into the keypad
   (c) The Smart-Fill checks the pin number. If the pin number is not valid, the fuel pump won't start.
4. The driver fuels the vehicle. Once the fuel delivery is complete, the Smart-Fill stores the details in its memory.

11.2 The Smart-Fill MENU Function.

- The Smart-Fill MENU is used to add keys and PIN numbers, and change the system settings etc.
- It is accessed by touching the MENU key (managers key) onto the sensors.
- The MENU will scroll through each option automatically, then you simply press **ENT**er while the line is scrolling across the screen to select that function.
- PLEASE NOTE – Some of the following options will not appear on your Smart-Fill system, depending on the version you have.
  - **Add a new touch key.**
    Used to enter a new vehicle key into the system, or to disable an existing key. See section 11.3 on page 43.
  - **Add a new driver PIN.**
    Used to enter a new driver PIN number into the system, or to disable an existing PIN / exclude the driver. See section 11.4 on page 46.
  - **Save data to SD card.**
    Used to copy fuel transaction data from the Smart-Fill memory onto the SD memory card. See section 11.5.1 on page 47.
  - **Clear system memory.**
    Used to clear the fuel transactions from SmartFill memory after a data download. See section 11.6 on page 48.
    - The fuel transaction data on the main memory chip is cleared, but the backup memory is not (it can not be cleared).
    - The KEYS / PIN numbers are not cleared, only the fuel transactions in the main memory chip.
    - **NOTE** – The data does not clear unless you PRESS and HOLD the ENTer key until 'CLEARING' shows on the display. You are warned a few times 'Are you sure', and you must keep holding the **ENT**er key until CLEARING appears.
  - **View fuel totals.**
    Used to view the accumulated total for a particular key. Can also be accessed on some systems by pressing 2 on the keypad. Not available on all systems.
  - **View system settings.**
    Scrolls through and displays the most important of the Smart-Fill settings. Can also be accessed on some systems by pressing 6 on the keypad.
  - **Set time and date.**
    Used to set the time and date in the Smart-Fill.
    - Clock format is 24 hour.
    - You must type in every digit, and the new setting is not saved until you press a key on the last digit.
  - **Set system Mode.**
    The Smart-Fill mode sets up the system options.
    - **DO NOT** change this setting unless you understand what you are doing.
    - Please contact your Smart-Fill supplier, or consult the relevant section of this manual before changing the MODE setting.
    - To set AC System Mode see section 11.7.2 on page 50.
    - To set DC System Mode see section 11.7.3 on page 51.

- **Low memory alarm.**
  The level at which the low memory warning will appear, this can be adjusted by the manager. The default setting is 2400 fuel issues (80% of memory capacity). So when the Smart-Fill contains 2400 fuel issues in its memory, the display will show 'LOW MEMORY', and the system will beep regularly. The data must be downloaded, and the memory must be then cleared to remove the warning.
- **Test comms TX line.**
  If you have a PC connected to the Smart-Fill via a hardwired connection, you can test the comms TX line from the Smart-Fill to the PC. This is useful for technicians to diagnose faults or check system setups etc.
  To test the comms line...
  - Connect the test rs232 or rs485 receiving PC to the office end.
  - Start a serial terminal program on the PC, such as Hyper-terminal or similar.
  - Touch the MENU key to the sensors to start the MENU operating.
  - When "COMMS TEST" or "TEST COMMS TX LINE" appears, press the ENTer key.
  - A test data string will stream from the Smart-Fill TX line, at 9600,n,8,1, with no handshaking.
  - You can test the Smart-Fill Rx line by sending the 3 characters "XX", CR (ENTER) to stop the data stream.
- **Read touch key ID number.**
  - If you have a PC connection to your Smart-Fill, you can load keys into the system remotely. Also you can enter your key (ibutton) id numbers into the Smart-Fill PC software for backup or transferring to a Smart-Fill.
  - To do this you need to know the internal 6 digit ID number of the ibutton (vehicle key) you are loading into the system.
  - The ID number is laser printed onto the front of the key, but normal wear and tear scratches this off in a short time, so to see the internal ID number, you can view it on the Smart-Fill screen.
  - To read a key ID number. Touch the MENU key to the sensors to start the MENU operating.
  - When "READ TOUCH KEY ID NO" appears, press the ENTer key, and just touch the key to the sensors. The ID number will appear on the screen, write it down.
  - Starting mid 2011, all SmartFill keys have the 6 digit ID engraved into the key fob.
- **Maximum delivery.**
  The maximum amount of fuel allowed in one issue can be set by the manager.
  - The Smart-Fill will stop the pump / valve at the set amount.
  - This is a global setting for all fuel issues, and can not be set individually for each key / vehicle.
  - To set the maximum delivery...
    - Touch the MENU key to the sensors to start the MENU operating.
    - When "Maximum delivery" appears, press the ENTer key.
    - Type in the number of Litres you want as a maximum, and press ENTer.
    - NOTE – The maximum value you can set is 60,000 Litres.
- **Set Walk-time (no flow).**
  - The Smart-Fill has a feature which prevents the pump from running for extended periods with no fuel flow, called.
  - The amount of time can be adjusted on version 9.6 systems for up to 2 minutes, in 1 second increments.
  - To set the walk-time...
    - Touch the MENU key to the sensors to start the MENU operating.
    - When "SET WALKTIME" appears, press the ENTer key.
    - Type in the number of seconds you require for Walktime, and then press the ENTer key.
- **Set site ID number. (Single hose Smart-Fills only)**
  - Users of more than 1 Smart-Fill can set a site ID number internally in the Smart-Fill, to identify which system the downloaded data is from.
  - The site number can be any number from 1 to 16, and then appears in the 'PUMP NUMBER' column of the data download at the PC.
  - To set the site ID number...
    - Touch the MENU key to the sensors to start the MENU operating.
    - When "SET SITE ID NUMBER" appears, press the ENTer key.
    - Type in the number and press the ENTer key.
- **Set site Offset. (Multiple hose Smart-Fills only).**
  Users of multi hose Smart-Fills, can set the offset number for that system. E.g.: Your company has 2 dual hose Smart-Fill systems, so the data from both would show in the download as pumps 1 and 2. You can set the offset number in one of the systems to 2, and this would then make the pump numbers appear in the download as 3 and 4. The offset number is simply added to the pump number for the data recording purposes.

- To set the site offset number...
  - Touch the MENU key to the sensors to start the MENU operating.
  - When "SET SITE OFFSET" appears, press the ENTer key.
  - Type in the number and press the ENTer key.

⊙ **Calibrate KFactor.**

- Used to adjust the calibration of the Smart-Fill, proportional to the number of pulses per Litre it is receiving from the flow meter.
  WARNING
-  KFactor should only be adjusted by qualified installation / service staff.
- See specific calibration instructions at section 9 on page 31.

⊙ **Export Keys and PINs.**
Used to copy the complete list of keys and PIN numbers from the Smart-Fill system onto the SD memory card. For more information see section 11.3.5 on the following page.

⊙ **Import Keys and PINs.**
Used to copy a list of keys and PIN numbers from the SD memory card into the Smart-Fill. This requires an ACCESS code, the access code is the 'ID Number' written on the MENU key tag (NOT the Serial Number). For more information see section 11.3.5 on the next page.

⊙ **Issue display time.**
Not available on all versions.

- The Smart-Fill shows the fuel delivery details on its display at the end of a delivery.
- The amount of time that it stays on the display can be set, to a maximum of 1 minute, in 1 second increments.
- To set the display time...
  - Touch the MENU key to the sensors to start the MENU operating.
  - When "ISSUE DISPLAY TIME" appears, press the ENTer key.
  - Type in the number of seconds, and press the ENTer key.

11.3 Vehicle ID keys (buttons).

11.3.1 General key information.

- The ibutton type ID keys will not access the SmartFill until you load them into the Smart-Fill using the MENU (managers) key.
  You can load them into the Smart-Fill system via the following methods...
  1. Enter them into the Smart-Fill system manually, using the MENU key.
  2. Enter them into the Smart-Fill software on your PC, and then use the memory card to copy them to the Smart-Fill system.
  3. Dial in remotely if you have a modem link or cable connection, and load them one by one.
  4. Copy them over from another Smart-Fill using the memory card.
- The keys are very secure, there are over 16 Million possible key combinations.
- You can use one key in each vehicle, and also use that key at multiple Smart-Fill systems.
- You can load up to 2000 keys into each Smart-Fill system.
- You can only have 1 key for each vehicle, (unless you allocate more than 1 id number (1 to 2000) to the vehicle).
- You can use your MENU key to disable a key, by simply loading the MENU key into its place.
- You can use keys again if you have lost / disabled them.
- NOTE. If you load a key in as more than 1 ID number, then it will always find the lowest number first.
- You can purchase new / replacement keys from your Smart-Fill supplier.
- You can mount the keys / buttons to the vehicle to prevent swapping and loss, and use a special reader wand to touch onto the vehicle mounted button.

11.3.2 Key numbering system.

- The key numbering system in the SmartFill allows you to have 2000 unique vehicle keys, numbered 1 to 2000. This number (1-2000) is how each vehile is identofied in the system.
- There are also some more keys which can be used, outside of this range.
  - **2001.** This number can not be used, it is reserved for use as an 'unauthorised fuel issue' identifier. So that of you see that key number 2001 has taken fuel at some time, the SmartFill for some reason (theft or the system is bypassed) does not know which key to allocate the delivery to, it then uses key number 2001 to alert you.
  - **2002 and 2003.** Master Keys. If you load a key in as number 2002 or 2003, when that key is touched to the SmartFill, the SmartFill will prompt the operator to manually enter the vehicle ID number (1 to 2000). This is ideal for service trucks. You can only have 2 master keys in each SmartFill.
  - **2004. Recommended.** You can create a spare Menu key by loading it into the system as number 2004. When thay key is presented, the SmartFill will start the menu running.

11.3.3 How to add a new vehicle key into your Smart-Fill.

1. Have a new key ready.
2. Choose a number from 1 to 2000 for that key.
3. Touch the **MENU** key onto the sensors, to start the MENU operating.
4. When "**ADD NEW KEY**" appears, press enter.
5. The system will show "**ENTER VALUE**" on the display.
6. Type in the ID number for the key (a number from 1 to 2000), and press Enter.
7. When prompted, touch the new key to the sensors, being sure to make a clean contact without pressing too hard.
8. The display will show 'ENTER VALUE' again, you can either load in another new key, or press cancel to exit.

11.3.4 How to disable a lost or no longer required vehicle key...

1. Touch the **MENU** key onto the sensors, to start the MENU operating.
2. When "ADD NEW KEY" appears, press ENTer.
3. The system will show "ENTER VALUE" on the display.
4. Type in the ID number for the key you are disabling (a number from 1 to 2000), and press Enter.
5. When prompted, touch the MENU key back onto the sensors, being sure to make a clean contact without pressing too hard, as shown previously.
6. This will stop the original key from operating.
7. You can either disable another key again, or press cancel to exit the routine.

11.3.5 Transferring keys from version 9.4 to new 9.6 SmartFill.

IMPORTANT – You MUST have the LATEST releases of version 9.4 and 9.6 SmartFill software on your PC before you go any further.

1. **Retrieve keys and pins from the version 9.4 (memory key) system...**
   (a) Create a backup memory key in your v9.4 SmartFill, as key number **1004**.
   NOTE – You need a memory key, not a standard vehicle key, they are different. You can use your data downloading key, but you must first disable key 1001.
   (b) Download the keys and pins from the v9.4 system onto the key, by clipping it inside the door. Then wait until REMOVE KEY appears.
2. **Save the keys and pins to your PC...**
   (a) You need to update your SmartFill version 9.4 PC software, to the latest version 9.4 exe file (NOT 9.6) from the UPDATES page at the SmartFill web site before continuing...
   (b) Start the SmartFill v9.4 software.
   (c) Clip the memory key into the download cable.
   (d) Click on USB or SERIAL for the download adapter type.

(e) Click on TOOLS - IMPORT / EXPORT KEYS for SD card.

(f) Follow the prompts.

(g) Note where you have saved the 2 files.

3. **Import the files into the v9.6 software...**

(a) Start the version 9.6 software.

(b) Click the top Vehicle list tab.

(c) Click 'get keys from SD card'.

(d) Browse to the files you created previously.

(e) Click on the correct file and click OK.

(f) Now click on the Driver / Pin list tab.

(g) Click 'get PINs from SD card'.

(h) Browse to the files you created previously.

(i) Click on the correct file and click OK.

(j) Close version 9.6 software.

4. **Save the Vehicles and Pins onto your SD memory card...**

(a) Start the version 9.6 software.

(b) Click the top Vehicle list tab.

(c) Click 'Save keys to SD card'.

(d) Follow the prompts and save to the SD card.

(e) Now click on the Driver / Pin list tab.

(f) Click 'Save PINs to SD card'.

(g) Follow the prompts and save to the SD card.

5. **Copy Keys and PINs from the SD card to your new SmartFill...**

(a) Take the SD card and the door key to the SmartFill unit.

(b) Unlock the SmartFill door.

(c) Insert the SD card into the slot on the red circuit board.

(d) Wait about 10 seconds.

(e) Start the Menu running by touching the MENU key to the sensors.

(f) Press ENTer when "Import Keys and Pins' appears on the display.

(g) Enter the Access code, this is the ID number (not the serial number) written on your MENU key.

(h) The keys and pins will copy into the SmartFill.

(i) Test a key and PIN number.

11.3.6 Adding vehicle keys remotely via modem or cable...

NOTE – You MUST have the version 9.6.05 or later SmartFill software on your PC.

1. First, you must have dialed in and be connected to your SmartFill, with the window below on your screen.
2. Click on "Add a vehicle key"
3. In the first pop up window, type in the vehicle number (1 to 2000) and then press Enter. NOTE – You can also enter master keys as number 2002, 2003 plus a spare MENU key as number 2004.
4. In the second pop up window, type in the 6 digit ibutton ID number and then press Enter. NOTE: The number is engraved onto the steel ibutton face. It is also on the plastic key fob on newer ibutton keys. If the markings have worn off, you can also view the 6 Digit ID by just touching the key onto a SmartFill system.
5. Repeat the above process to add more keys.

11.3.7 Deleting vehicle keys remotely via modem or cable...

NOTE – You first MUST have the version 9.6.05 or later SmartFill software on your PC.

1. You must have dialed in and connected to your SmartFill, with the window below on your screen.
2. Click on "Delete a vehicle key".
3. In the pop up window, type in the key number you wish to delete. (1-2000) and then press Enter. NOTE – You can also delete key numbers 2002, 2003 and 2004.
4. Repeat the above process to delete more keys.

11.4 Driver PIN numbers.

11.4.1 General PIN number information.

- The PIN number system is designed primarily to provide extra security for your Smart-Fill system, and also to identify the driver who fueled the vehicle if required.
- You can load up to 2000 PIN numbers into the system.
- A PIN number can be any number from 1000 to 65000.
- You can disable a PIN, by simply loading a different PIN into its place.
- WARNING  If you have PINS not linked to keys, and you load the same PIN number into the system for 2 drivers, it will always find the lowest driver ID number first. To prevent this, ensure that all drivers have different PIN numbers.

11.4.2 How to add a PIN number for a driver.

1. Touch the MENU key onto the sensors.
2. When "ADD PIN NUMBER" appears, press enter.
3. The system will show "ENTER VALUE" on the display.
4. Type in the ID number for the driver (a number from 1 to 2000), and press Enter.
5. Type in the PIN number for the driver (a number from 1000 to 65000), and press Enter.
6. You can either add another PIN again, or press cancel to exit the routine.

11.4.3 How to disable a PIN number.

1. Touch the MENU key onto the sensors.
2. When "ADD PIN NUMBER" appears, press enter.
3. The system will show "ENTER VALUE" on the display.
4. Type in the ID number for the driver or Key, and press ENTer.
5. Type in a random PIN number from 1000 to 65000 and press ENTer. TIP – Use a 5 digit number (less than 65000) when disabling a PIN number.
6. You can either disable another PIN again, or press cancel to exit the routine.

11.4.4 How to copy KEYS and PIN numbers to another SmartFill.

Note, the 'source' system is the Smart-Fill you are copying the keys from. The 'destination' system is the Smart-Fill you are copying the keys onto.

1. **Copy keys and pins from the source Smart-Fill onto the memory card.**

   At the SOURCE Smart-Fill...

   (a) Insert the memory card into the slot behind the door on the RED circuit board.
   (b) Start the MENU with the MENU key.
   (c) Press ENTer when EXPORT KEYS PINS appears on the screen.
   (d) Do not remove the card until "Remove Card" appears.

2. **Copy keys and pins from the memory card to the destination Smart-Fill.**
   IMPORTANT – Before you can copy the keys and pins to the destination Smart-Fill, you MUST rename the first 4 digits of the 2 files on the SD card, to match the serial number of the destination Smart-Fill.
   Example : If you are copying from system serial No 1355 to system 1349, then you must rename the files called **1355**KEYS.SFK and **1355**PINS.SFP
   You must rename them to **1349**KEYS.SFK and **1349**PINS.SFP

   (a) You need the MENU key and door key for the destination Smart-Fill, and also the SD card to perform this operation.

   (b) Open the destination Smart-Fill door, and insert the SD card into the slot on the RED board.

   (c) Touch the MENU key to the Smart-Fill to start the menu scrolling on the display.

   (d) When IMPORT KEYS PINS appears on the screen, press ENTer.

   (e) When 'ACCESS CODE' appears, type in the **MENU key ID number** and press ENTer.
   NOTE: The MENU key ID number is written on the MENU key tag.

   WARNING

   (f)  Do not remove the card until "Remove card" appears.

   (g) Always test a few keys and pin numbers to be sure that keys have copied across OK.

11.5 Downloading Transaction Data to PC.

11.5.1 Download using memory card.

1. Take the Memory Card, and a door key to the Smart-Fill.
2. Unlock the Smart-Fill door.
3. Insert the memory card into the slot on the RED circuit board.
4. Start the MENU using the MENU key.
5. Press ENTer when 'Save data to SD card' appears on the screen.
6. Nothing will happen for a few seconds while the Smart-Fill checks the card, then you should see numbers counting on the screen as the data is copied.
7. DO NOT remove the card until 'Remove card' appears on the screen.
8. DO NOT touch buttons or press keys while the download is in progress.
9. Go to your PC and download data from the card onto a computer.
   See separate instructions for downloading data at the PC, section 13 on page 56.
10. After confirming that all data looks OK, return to the Smart-Fill and clear the memory, see section 11.5.1.

NOTE – The Smart-Fill can be configured to automatically clear the memory after downloading data to the SD card.

WARNING

 This is will clear the normal memory automatically as soon as the data is downloaded, without checking any of the data. However the backup data will remain unchanged, as it can not be cleared.
To have your Smart-Fill automatically clear the memory after downloading data, simply set the low memory warning level to 2401.

11.5.2 Download BACKUP transactions using memory card.

1. Take the Memory card to the Smart-Fill.
2. Unlock the Smart-Fill door.
3. Insert the memory card into the slot on the RED circuit board.
4. Start the MENU using the MENU key.
5. Press ENTer when 'Save data to SD card' appears on the screen, then...
6. **IMMEDIATELY Press and hold 1** on the keypad for 15 seconds.
7. You should see numbers counting on the screen as the data is copied.

8. NOTE – This procedure takes approximately 15 – 20 minutes, due to the large amount of data being copied to the card (4000 fuel issues).
9. DO NOT remove the card until 'Remove card' appears on the screen.
10. Go to your PC and download data from the card onto a computer.
11. You can not clear / delete the backup memory.

11.5.3 Download using modem.

- The procedure for downloading data using a PC connection is outlined in the separate information sheet to suit the download method. However, the basic procedure for all PC connections is.

    1. Start the Smart-Fill program on your PC.
    2. Click on Download data from ... MODEM.
    3. Click on the button at left of the Smart-Fill you want to connect to.
    4. When connected, click on the DOWNLOAD button.
    5. Once downloaded, you can choose to clear the memory if required.
       The access code to clear the memory is the ID number written on the MENU key.
    6. Click to DISCONNECT from the Smart-Fill. **WARNING** - You MUST disconnect this way.
    7. Click on CREATE A FUEL DATA FILE.
    8. Follow the prompts to save the data file in a spreadsheet format.

11.5.4 Downloading via modem from a Smart-Fill fitted to a vehicle.

It is recommended the following procedure be followed to ensure good communications.

1. The vehicle MUST be stationary.
2. The vehicle should have its engine switched off.
3. The Smart-Fill must be powered on.
4. The vehicle needs to be in an area with acceptable phone signal strength.
5. NOTE - The Smart-Fill incorporates a method to check the signal strength. Press 4 on the keypad, and the signal strength will be shown on the display.

11.6 Clearing the fuel transaction memory.

- The memory in the Smart-Fill **MUST** be cleared regularly after downloading data, to prevent the Smart-Fill memory from becoming overfull.
- The memory capacity is 3000 transactions.
- If you use a modem or cable connection to dial into the Smart-Fill, you cannot clear the memory until after you have downloaded data. You also need to enter an access code to clear the memory. The access code is the MENU key ID number written on the MENU key tag (not the serial number – please check).

    ⊙ TIP – If you wish to automatically have the memory cleared after downloading (to SD card only), set the 'Low Memory Alarm' level to 2401. Then as soon as the data has been saved to the memory card, the memory will be cleared. Do not do this until you are familiar with the operation of the Smart-Fill system.

11.6.1 Clearing the memory for SD Memory Card Downloads.

- At the Smart-Fill, touch the MENU key to the sensors to start the MENU operating.
- When "CLEAR SYSTEM MEMORY" appears, press and hold the ENTer key.
- When "CLEARING" appears on the display, you can stop pressing the ENTer key.
- The memory has now been cleared.
- WARNING  The memory has only been cleared if CLEARING shows on the display.

11.6.2 Clearing the memory for Modem / Hardwire (cable) downloads.

- When you click on DOWNLOAD (after dialing in and connecting to the Smart-Fill), the download of data will start.
- After the data has finished downloading, the DOWNLOAD button now shows CLEAR MEMORY.
- This is the only time it is possible to clear the memory when dialing in remotely. If you forget to clear the memory at this point, you will need to download data again before the CLEAR MEMORY button will become available.

1. Immediately after downloading data to your PC, click on CLEAR MEMORY.
2. When prompted for an access code, type it in and press OK.
3. NOTE – The access code is the ID number (not the serial number) written on the MENU key.
4. The response message box should turn red and confirm that the memory is being cleared.

11.7 Smart-Fill MODE options.

The Smart-Fill MODE setting is used to set up the system options. This enables the manager to turn on or off, items such as PIN number requesting, Speedo requesting, Modem communications etc. The method is simply adding a different amount for each option, to a mode number. The mode number starts as zero, and then you add a certain number onto the mode if you want that particular option, or don't add it to the mode if you don't want the option.

11.7.1 Mode Options Setup.

- Mode charts differ depending on the model of your Smart-Fill system.
- Some options listed may not suit your Smart-Fill, depending on the build date. For this reason it is important to correctly select your type of Smart-Fill before you change the mode setting.
- You can contact the manufacturers (by email only) before adjusting the Mode setting, to check settings for your particular system. Email address is **sales@fluidmt.com**
- Please include details on the options you wish to use, and tell us your system Serial number (which is written on the MENU key, and on the Smart-Fill ID data plate, usually affixed to the bottom RH side of the Smart-Fill.

11.7.2 Mode options chart for AC powered systems only.

Value	v9.6 Single	v9.6 Multi	v10.6 Gilbarco Comms Single (Now Obsolete)	v10.6 Acme Single	v11.6 Multi Gilbarco Comms
1	N/A	Link Keys to Pump 1 or 2	N/A	Link PINs to Keys	Link Keys to Pump 1 or 2
2	Radio Start	Radio Start	N/A	N/A	Radio Start
4	Preset Delivery	Preset Delivery	Preset Delivery	Preset Delivery	Preset Delivery
8	Comms Type	Comms Type	N/A	Comms Type	Comms Type
16	N/A	N/A	5/6 Digit Litres	N/A	N/A
32	Turn Comms On	Turn Comms On	Turn Comms On	Turn Comms On	Turn Comms On
64	SmartDip Fitted	SmartDip Fitted	SmartDip Fitted	SmartDip Fitted	SmartDip Fitted
128	Ask for PIN number	Ask for PIN number	Ask for PIN number	Ask for PIN number	Ask for PIN number
256	Display Litres	N/A	N/A	N/A	N/A
512	Flow Meter Detection	N/A	Radio Start	N/A	N/A
1024	Link PINs to Keys	Link PINs to Keys	Link PINs to Keys	N/A	Link PINs to Keys
2048	Daily Dip SMS	Daily Dip SMS	N/A	Daily Dip SMS	Daily Dip SMS
4096	N/A	N/A	N/A	N/A	N/A
8192	N/A	N/A	N/A	N/A	N/A
16384	Ask for Speedo (Odometer)	Ask for Speedo (Odometer)	Ask for Speedo (Odometer)	Ask for Speedo (Odometer)	Ask for Speedo (Odometer)
32768	N/A	N/A	Show Pump Codes	N/A	N/A

Table 3: Mode Options for AC SmartFill

11.7.3 Mode options chart for DC powered systems only.

Value	v9.6 Single	v9.6 Multi	v10.6 Acme Single	v11.6 Multi Acme Comms (Obsolete)
1	N/A	Link Keys to Pump 1 or 2	Link PINs to Keys	Link Keys to Pump 1 or 2
2	Radio Start	Radio Start	N/A	Radio Start
4	Preset Delivery	Preset Delivery	Preset Delivery	Preset Delivery
8	Comms Type	Comms Type	Comms Type	Comms Type
16	N/A	N/A	N/A	N/A
32	Turn Comms On	Turn Comms On	Turn Comms On	Turn Comms On
64	SmartDip Fitted	SmartDip Fitted	SmartDip Fitted	SmartDip Fitted
128	Ask for PIN number	Ask for PIN number	Ask for PIN number	Ask for PIN number
256	Display Litres	N/A	N/A	N/A
512	Flow Meter Detection	N/A	N/A	N/A
1024	Link PINs to Keys	Link PINs to Keys	N/A	Link PINs to Keys
2048	Daily Dip SMS	Daily Dip SMS	Daily Dip SMS	Daily Dip SMS
4096	N/A	N/A	N/A	N/A
8192	Auto Power Off	Auto Power Off	Auto Power Off	N/A
16384	Ask for Speedo (Odometer)	Ask for Speedo (Odometer)	Ask for Speedo (Odometer)	Ask for Speedo (Odometer)
32768	Set as 2 Hose with Single Flowmeter. SEE NOTES	N/A	Set as 2 Hose with Single Flowmeter. SEE NOTES	N/A

Table 4: Mode Options for DC SmartFill

11.7.4 Mode Chart Option Descriptions.

Radio Start. Add if vehicle radio authorization modules are used in any of your vehicles, and a radio module is fitted to the Smart-Fill.

Preset Delivery. Add if you wish to preset Litres before a delivery, and turn the pump / valve off at the requested amount.
WARNING

This does not ramp down the flow prior to stopping, care must be taken with sudden stopping of some dispensing systems, as damage can occur to components.

Comms Type. Add only if using a cable connection between the Smart-Fill and office PC. Leave out for 3G modem comms.

Turn Comms On. Add if using any type of data connection (modem or cable) between Smart-Fill and office PC.

SmartDip fitted. Add if a SmartDip tank gauging system is built into the Smart-Fill system.

Ask for Pin No. Add if you want to request a PIN number for each fuel issue.

Flow Meter Detect. Add if you wish for the Smart-Fill to detect flow meter movement when the system is unauthorized. **NOTE**- This option should not be used unless the metering system is set up correctly with non return valves etc, as errors will occur, and many very small transactions may be recorded over time. The primary purpose is to alert you if fuel has been taken when the system has not been authorised with a key. This feature is not available with all Smart-Fill versions for various reasons.

Link Pins to Keys. Add if you require the PIN numbers to be linked to vehicle keys, instead of the PIN numbers identifying the driver issuing the fuel.
NOTE- This method will NOT identify the driver at each fuel issue.

Daily Dip SMS. Add if you have SmartDip (Version 7 or later only) fitted, plus you have a modem connected to the SmartFill, and you wish to receive a daily SMS message at a preset time. NOTE- The preset time is set in the V7 SmartDip board.

Auto Power Off. Add if you wish for the Smart-Fill to power itself off after a timeout period in minutes. The time period can be set in minutes in the MENU. Available on DC powered systems only.

Ask For Speedo. Add if you wish to enter Speedo / Hour meter readings for each fuel issue.

Link Keys to Pump 1 or Pump 2. NOTE - 2 hose systems only.
Add if you wish for Odd numbered keys to automatically start pump 1, and even numbered keys to automatically start pump 2. The driver will not be required to enter a pump number. This can be used to prevent diesel keys accessing petrol pumps etc.

Show pump codes. NOW OBSOLETE - Add if you wish to permanently show Gilbarco comms pump codes on the display. This is for service personnel only. See Smart-Fill / Gilbarco comms documentation for further information.

Set as 2 hose Single. Add if your system is a single SmartFill, but you have 2 outlet hoses, each controlled by a solenoid valve etc. This enables you to use only 1 pump and flow meter, but use 2 fuel nozzlkes, and select hose 1 or 2 for the delivery.
WARNING
 This is only possible on SmartFill DC circuit boards marked with "Rev09**C**.pcb" or later (eg Rev09**D** and higher).

11.7.5 Calculating the Mode Setting.

- First, you must select your version of Smart-Fill from the AC and DC charts above.
- IMPORTANT: The setting is calcuated by adding together the options required, and the result is the new MODE setting.
- Select the options that you need from the correct column in the chart, and then add together the applicable numbers in the left column.
- For example, to turn Pin Number Requesting on, and turn Speedo requesting on, you would add 128 + 16384. The result is 16512.
  You would simply set the Mode value to 16512, and the system would then ask for PIN numbers and Speedo readings.
- Any of the options that you don't need, don't add their value to the mode setting, i.e.: treat them as a zero.

11.7.6 Changing the mode setting.

- The mode value is easily changed, using the MENU key.

  1. Touch the MENU key to the sensors, to start the menu operating.
  2. When "SET SYSTEM MODE" appears, press ENTer.
  3. Type in the new mode value, and press ENTer.
  4. The Mode setting will now be updated.

12 Troubleshooting at the Smart-Fill unit.

12.1 Key Problems ?.

12.1.1 Require more vehicle keys ?

- You can order new SmartFill keys from your SmartFill supplier.

WARNING

-  Always use genuine SmartFill keys, as there are several types of button, and some types do not operate correctly with Smart-Fill system due to differences inside the button.

WARNING

-  Check that your supplier can guarantee that the keys will be Smart-Fill compatible before purchasing.

12.1.2 Smart-Fill does nothing when a key is presented.

1. Ensure the Smart-Fill is powered on.
2. Check the area around the sensors for dirt or moisture, and clean with a soft cloth if necessary.
3. Perform a power reset by turning the power OFF to the Smart-Fill for 30 seconds, then on again.
4. Try another key, if it works, then the ibutton may be faulty.
5. Check that the SmartFill processor is actually running, you can check this by watching that the Time is being updated on the display each minute.
6. If another key also does not work, have an electrician check the Smart-Fill is properly powered.
7. If the key has not been supplied by the Smart-Fill manufacturers, it may not be compatible.
8. If all above are OK, arrange a Smart-Fill supplier to inspect / service your Smart-Fill.

12.1.3 Keys shows as 'INVALID'.

- The key may not have been loaded into the Smart-Fill, or may be an incompatible type key (not a genuine manufacturer supplied Smart-Fill key).
- If the front of the SmartFill is wet, you may need to dry the area around the key sensors with a tissue or clean rag. Moisture around the sensors will cause the keys to misread.

12.1.4 Key works but as wrong vehicle number.

Either...

1. The key has been loaded into the system as the wrong number, or...
2. The key has been loaded in as more than one number. If the key shows as a lower number than it should, simply disable the lower numbered key. See section 11.3.4 on page 44.

12.1.5 Lost vehicle keys.

If you lose a vehicle key...

1. Disable the key, see section 11.3.4 on page 44, or...
2. Replace the key with a new one, see section 11.3 on page 43. If you replace it, the old key will no longer operate the system. If you later find the key, just keep it as a spare.

If you find old keys, you can use them again. Test them on the Smart-Fill when finding them to ensure they work, but will not operate the system. If they do operate, disable that number in the system.

12.1.6 Lost MENU key.

- You can install a new MENU key if you lose it, however you need to contact your Smart-Fill supplier and provide the serial number of your Smart-Fill, to purchase a MENU key replacement procedure.
- There is a fee for the time searching / updating your system software and to obtain the special access codes for your Smart-Fill.
- We strongly recommend making a spare MENU key when first installing your system. See section 11.3.2 on page 44.
- NOTE – You may also need to change your Smart-Fill door lock for security reasons if the keys have been lost. See the information 12.1.7 on the following page.

12.1.7 Lost door lock key.

If you lose your Smart-Fill door lock key, you should replace the lock immediately. Some Smart-Fill systems have a bypass switch fitted internally, and having the door key may give the person the opportunity to bypass the Smart-Fill, and take fuel unauthorized, and unrecorded.

12.2 PIN Number Problems ?.

12.2.1 Not asking for PIN number.

- The Smart-Fill may not have PIN number requesting turned on in the MODE setup. Consult your SmartFill installer and turn the PIN number requesting ON.

12.2.2 Wrong driver number showing.

- The same PIN number has been loaded in for more than driver. You can not use the same PIN number for multiple drivers, unless you choose to LINK KEYS AND PINS in the MODE setup.

12.2.3 Not accepting a new PIN number.

The PIN MUST be a number between 1000 and 65000, (this is to ensure a minimum 4 digit PIN is used).

12.3 Pump / dispenser problems.

12.3.1 Pump stops after a short period.

The cause of this problem is easier to identify, if you check that the Litres taken were recorded or not.

1. If Litres are NOT recorded by the Smart-Fill...
   (a) The Smart-Fill is most likely not receiving pulses from the flow meter.
2. If Litres ARE recorded by the Smart-Fill.
   (a) The Smart-Fill thinks that the nozzle has been hung up. Check wiring / micros witches etc.
   (b) The wiring to the pump / valve may be faulty / poor connections. Check all wiring.

12.3.2 Smart-Fill is not recording Litres accurately.

1. Version 9 systems (pulse input and relay / valve control).
   (a) Smart-Fill is not calibrated correctly to flow meter / dispenser. The Smart-Fill should be calibrated with a proving measure or master flow meter.
   (b) Pulses from flow meter are too fast for the Smart-Fill. The maximum pulse rate is approx 50 Hz if you wish to display Litres.
   (c) Flow meter pulses are too fast and Smart-Fill is set to display Litres, turn the display Litres option off in the MODE options setup.
   You can check if the pulses are too fast by running a few fuel issues at low speed and see if the accuracy improves.
   (d) Operators may be turning the power off via an emergency stop switch, which also turns the Smart-Fill power off before it can save the fuel data.
   Some systems will record data in a power failure, depending on the system type / configuration.
2. Version 10 or 11 systems (communications control).
   (a) Gilbarco communications systems...
      i. The Smart-Fill and the dispenser MUST both be in the same 5 or 6 digit mode. If they are set differently, the Decimal point in the Litres reading may be in the wrong place. See the relevant installers documentation for 5/6 digit setup procedures.
      ii. The Dispenser may be set in 5 digit mode, but still allowing a fuel delivery over 999.99 Litres. This has occurred previously on PEC dispensers, and it causes the dispenser to lose the 1000's in the Litres, i.e. a delivery of 1354.77 Litres is recorded as 354.77. This is a dispenser issue, not a Smart-Fill issue. Ensure that both the Smart-Fill and the dispenser are both set in 6 digit mode wherever possible.
   (b) Acme communications systems (bulk flow meters).
   NOTE- The Acme unit internal settings are factory preset and MUST NOT be changed.
      i. The only setting in the Acme unit which may be adjusted by the installer is the calibration adjustment (scale / KFactor).
      Any change to decimal point placement settings etc will affect the accuracy of the system.

12.4 Memory Low / Full appears on Display.

If the LC Display on your SmartFill shows memory LOW or memory FULL, then the memory must be downloaded immediately. This warning appears to assist in preventing you from overfilling the memory, and consequently losing data.

1. Power the SmartFill OFF for at least 30 seconds.
2. Download the data via memory card or modem.
3. Clear the memory in the SmartFill.

12.5 Data download problems at the Smart-Fill.

12.5.1 'Card Fault' shows at the Smart-Fill.

- Perform a power reset on the SmartFill by powering ot off for 30 seconds.
- The card may not be inserted correctly. Remove the card for approx 10 seconds and re-insert it.
- The card may need to be formatted. Note, the Smart-Fill SD memory card must be formatted as 16 bit.
- The card may be too large. The maximum recommended SD card capacity is 2Gb.

13 SmartFill Software Guide (v9.6).

13.1 Overview of Software.

The SmartFill PC software performs 3 primary functions.

1. Provides a system to download the transaction data from your SmartFill to your PC.
   (a) By Importing data using an USB drive, or...
   (b) By downloading data using the mobile phone (3G) network.
2. Stores a list of your vehicles and drivers on your PC.
3. Generates a spreadsheet report of your fuel transactions, combining the data from your SmartFill, and your list of Drivers / Vehicles.

It also has some extra features, which can be optionally used.

- Totals reporting, to summarise the total amount of fuel used per vehicle for the recorded period.
- Tank dip reporting if you have a modem fitted to your SmartFill, and have the SmartDip system fitted as well.
- Basic product loss / gain analisys using the 'Tank Report'function.
- Basic Service Scheduling.

13.2 Software Installation.

- Your pc software package is pre-loaded onto the USB drive which came with your Smart-Fill system.
- If you do not have the software, it can be downloaded free of charge from the Smart-Fill web page.
- You may need to have your I.T. people do the software installation, as in most cases it must be installed under Administrators Password when it is a

1. Insert the memory card into your pc.
2. Wait a minute or so for it to be recognized as a new drive, eg Drive :F .
3. Open the Drive eg :F
4. Open the folder 'Smart-Fill v9.6 PC Software'.
5. Double click on the file 'Smart-Fill96.msi' to start the installation

The Welcome window will appear, Click NEXT to continue...

You can install the software to a different location than suggested, however it is recommended to accept the default settings.

Then Click NEXT again to continue...

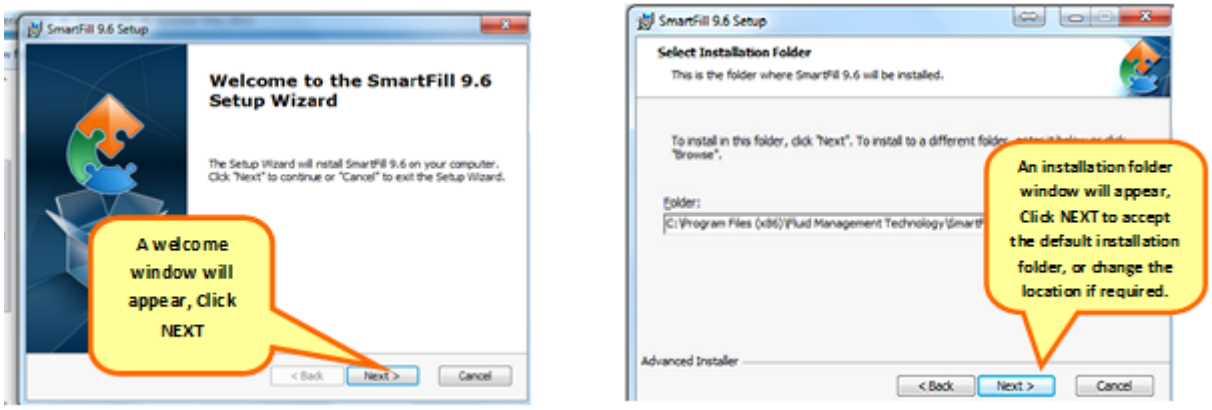


Figure 24: Software Welcome and Installation Folder.

A confirmation of installation will appear, Click NEXT to continue... The software will then begin installing to your PC.

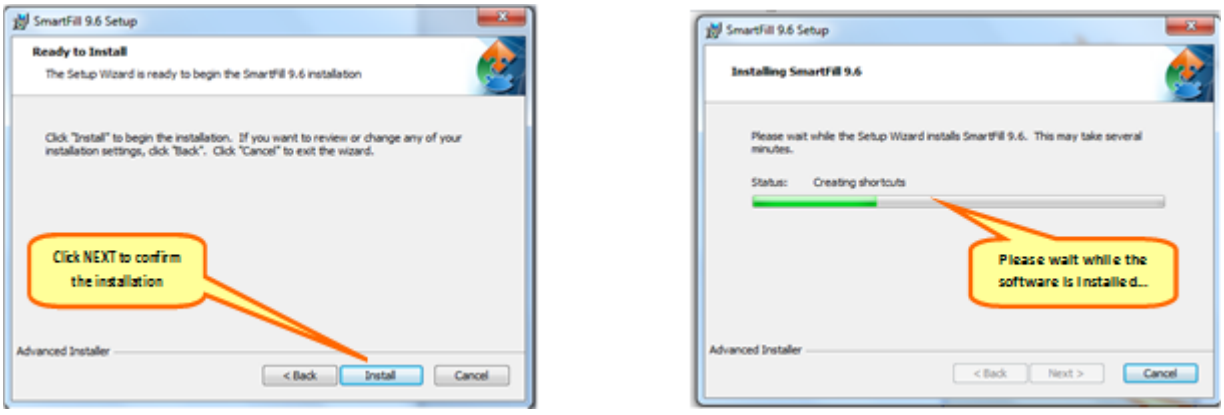


Figure 25: Software Installing.

A window will appear confirming that the software has been successfully installed...

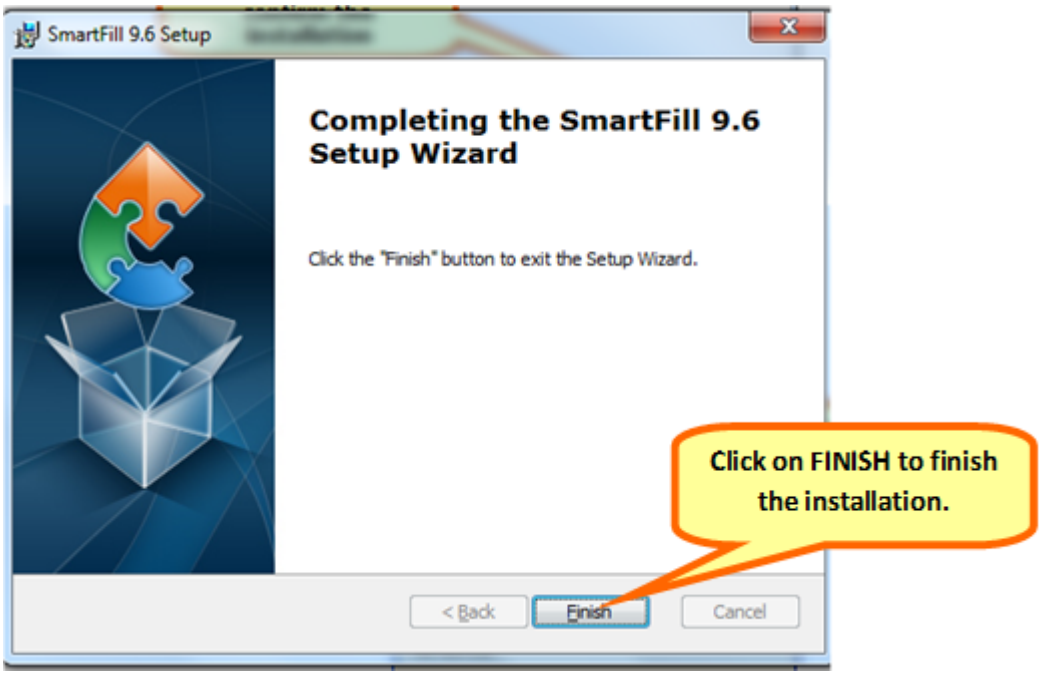


Figure 26: Installation Completed.

You can Start the SmartFill software from the main START menu as shown, or a link will be located on your desktop.

The SmartFill Software program will then open...

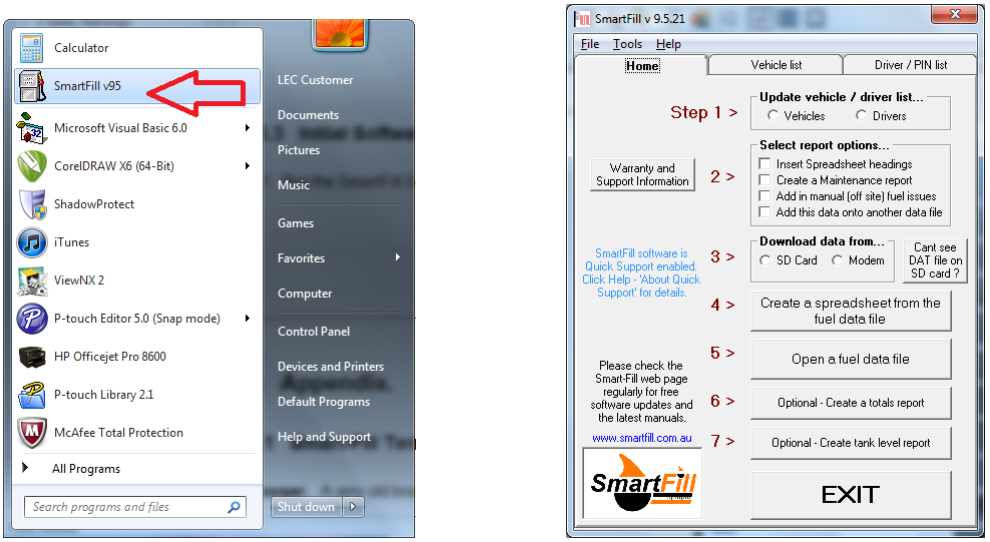


Figure 27: Opening the SmartFill Program.

13.3 Software Operation.

13.3.1 Edit Vehicle Details.

After opening the SmartFill software, open the vehicle list by clicking on the **'Vehicle List'** tab at the top of the window.

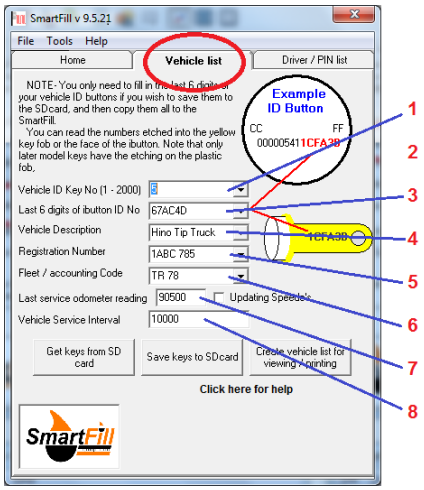


Figure 28: Editing Vehicle Details.

1. **Enter Vehicle ID number (1 - 2000).**

   (a) Using the mouse, highlight the first field, **Vehicle ID key No**.

   (b) Type the vehicle ID number (1 to 2000), then press Enter. Note we typed 5 in this example.

   (c) Press Enter to step to the next field.

2. **Enter the 6 digit ibutton ID.**
   This is an optional field, which enables you to enter all of the key details into the software, and then copy them to your SD memory card, and directly import them into your SmartFill. You can choose not to record the 6 digit ID's in the software, but you will thern need to load all of your keys manually into the SmartFill.

   (a) Type in the 6 digit number engraved onto the key you have allocated for this vehicle (example shown on yellow tag in pictures below). Note some earlier keys did not have the number engraved.

   (b) Press Enter to step to the next field.

3. **Enter the vehicle description.**

   (a) Type in the vehicle description.

   (b) Press Enter to step to the next field.

4. **Enter the vehicle registration number.**

   (a) Type in the registration number.

   (b) Press Enter to step to the next field.

5. **Enter the vehicle fleet code**.
   This is an optional field, normally for use when importing the data created by the SmartFill software into another spftware package, such as a maintenance or accounting package.

   (a) Type in the fleet code.

   (b) Press Enter to step to the next field.

6. **Enter the Odometer / Hourmeter reading when the vehicle was last serviced.**
   This is optional, and only required if you wish to use the service scheduling feature in the SmartFill program.

7. **Enter the interval in Kilometres or Hours between services for this vehicle.**
   This is also optional and only required if using the service scheduling feature.

13.3.2 Edit Driver Details / Pin No.

WARNING

The details are not saved until you press Enter on the last field - 'Driver Name'.

After opening the SmartFill software, open the driver list by clicking on the **'Driver/ PIN List'** tab at the top of the window.

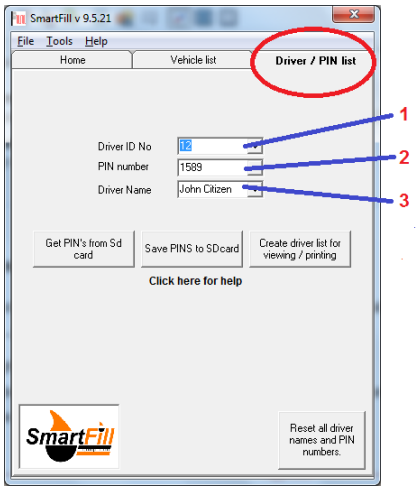


Figure 29: Editing Driver Details.

1. **Enter Driver ID number (1 - 2000).**
   (a) Using the mouse, highlight the first field, **Driver ID No**.
   (b) Type the Driver ID number (1 to 2000), then press Enter. Note we typed 12 in this example.
   (c) Press Enter to step to the next field.
2. **Enter the PIN number for this driver. (1000 - 60000).**
   (a) Type in the PIN number.
   (b) Press Enter to step to the next field.
3. **Enter the Drivers Name.**
   (a) Type in drivers name.
   (b) Press Enter to save the details.

13.3.3 Modem Software Setup.

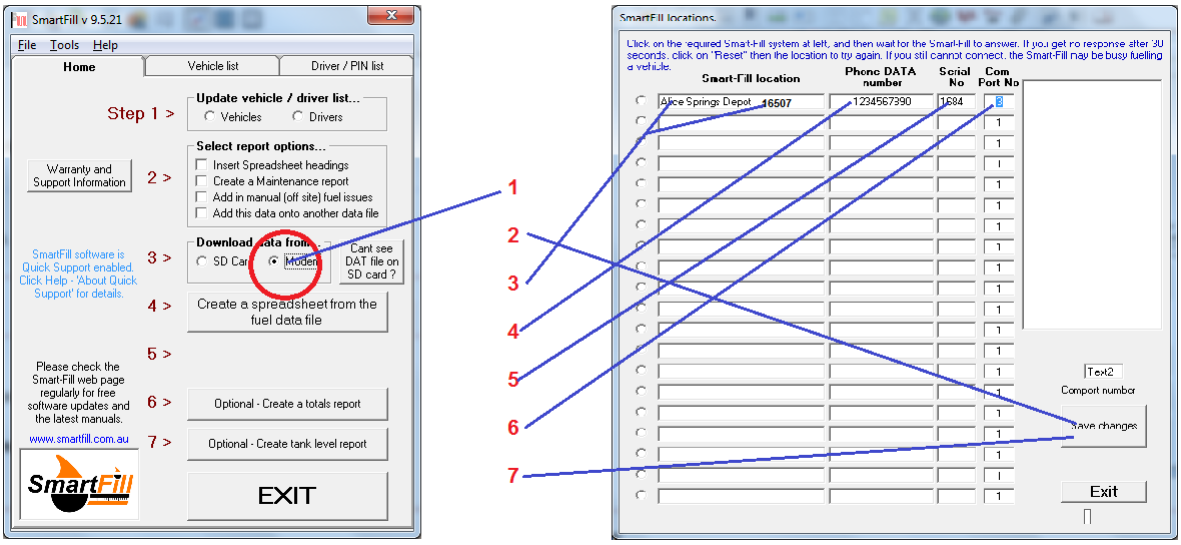


Figure 30: Modem Setup.

1. Click on '**Modem**'.
2. In the new window which appears, click on **Add / Edit Details**.
3. Highlight the Location Name, and type in the location.

   TIP Also put at the end of the description, the ID number which is shown on your Menu key. This is the access code required to remotely clear the memory, and you will be able to see it at the top of the screen at that time.
4. In the next field, type in the 10 digit **DATA** phone number for the sim card (not the voice number).
5. In the next field, type in the SmartFill serial number (optional).
6. In the last field, type in the comport number that your PC modem is connected to.
7. Click **Save Changes** to save the details.

13.3.4 Download Data Using USB.

- First, you need to download transaction data at the SmartFill, onto a USB drive. See section 11.5.1 on page 47.
- Insert your USB drive into your pc,
- Then open the SmartFill software, and click on 'USB/SD'.

1. When the browsing window opens, browse to the drive which is your USB drive
2. Highlight the data file on the Card.
3. Click Open.
4. In the File Save window which appears, click Save.
5. A popup window will advise you that thee file has been saved.

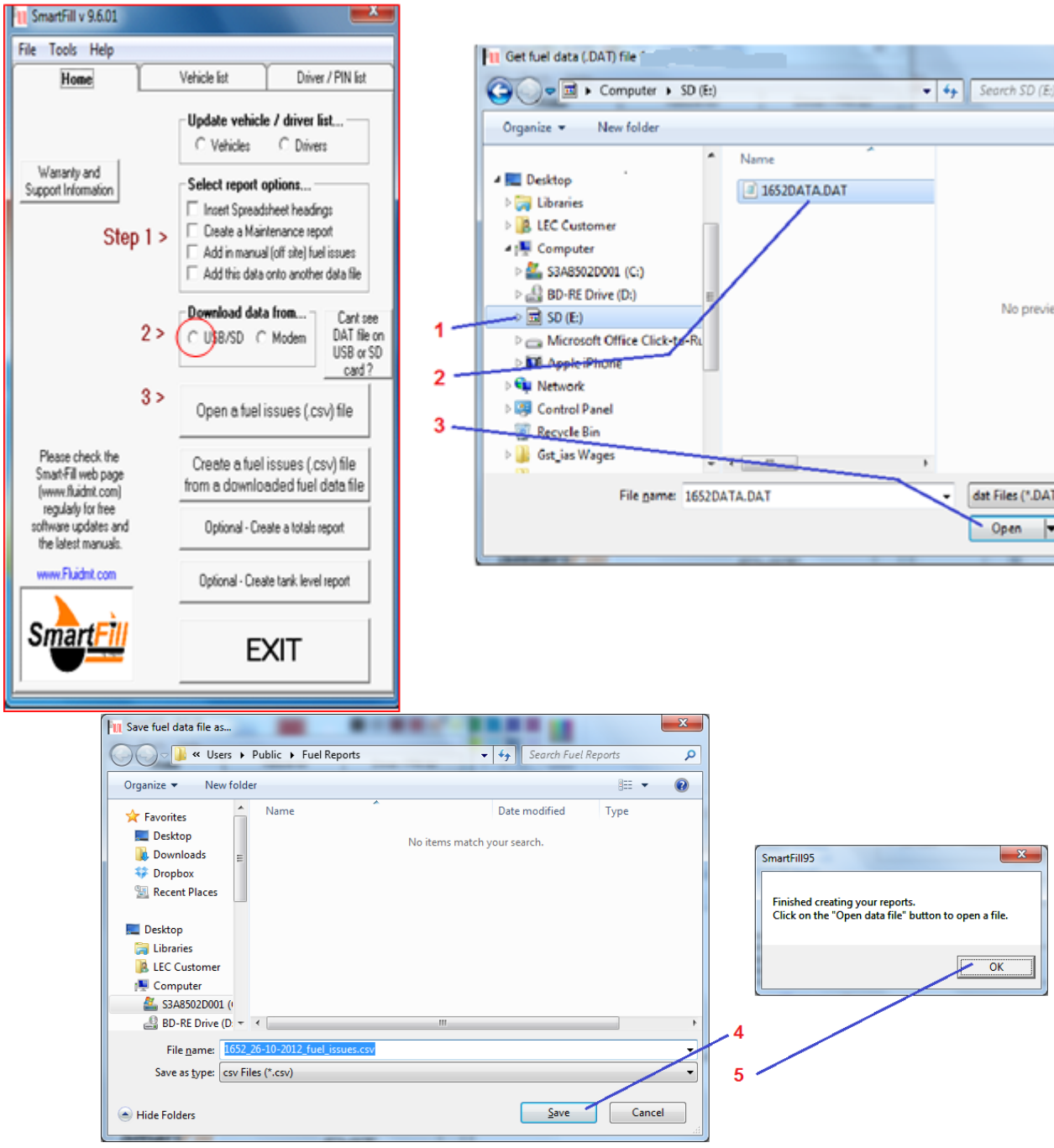


Figure 31: USB Data File.

13.3.5 Download Data Using Modem.

- First, You need to have the optional modem fitted to your SmartFill, with a correctly set up sim card, which has a data number attached to it.
- Your PC also requires a standard modem.

1. Click on '**Modem**' at step 3.
2. Click on the required SmartFill location.
3. Wait until either a new window appears, or a message appears on the right side of the window if it times out or an error occurs.
4. See the next page for options once a connection has been established withe the SmartFill.

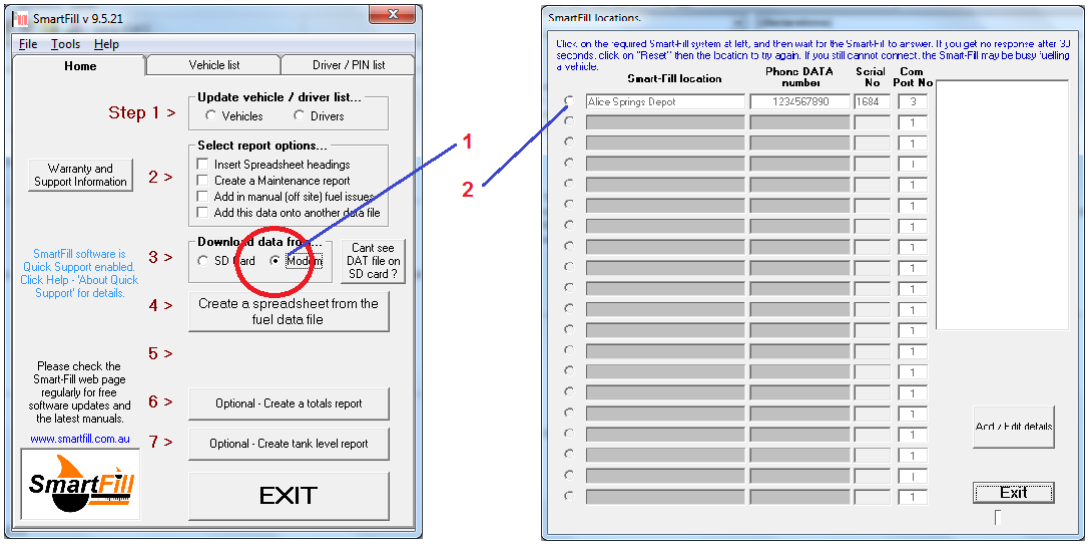


Figure 32: Modem Data Download.

- The window below will appear once a connection has been established.
- **NOTE** that if you do nothing for around 30 seconds, the connection will be disconnected automatically, to reduce the risk of the connection staying open for extended periods.

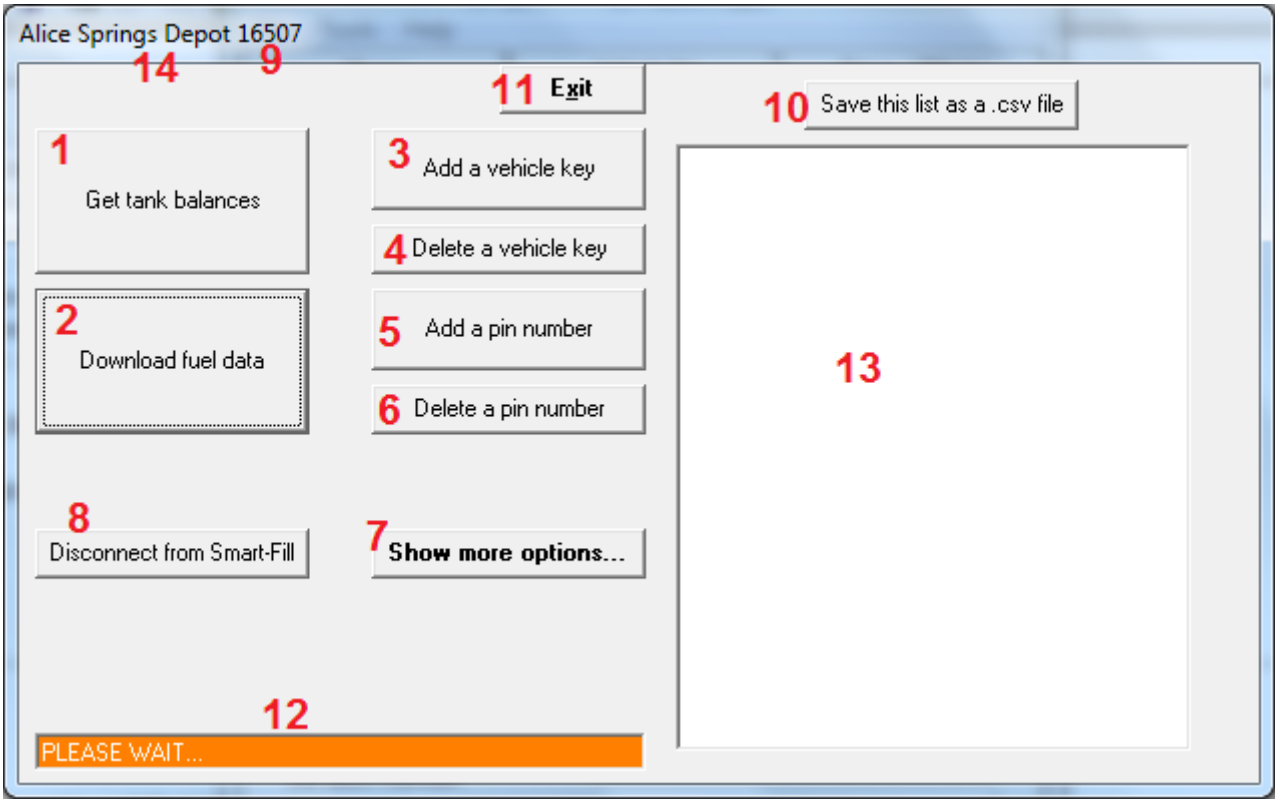


Figure 33: Connected to SmartFill.

1. If you have a SmartDip fitted to your SmartFill, clicking this button will (after a short delay) show tank levels in the RH side window (13). You can save them by clicking on button 10 - 'Save this list as a csv file'.
2. Click to **Download your transaction data to the pc**, then wait until the status box (12) turns yellow and shows 'SmartFill Ready'.
   (a) To **Clear the Memory** at the SmartFill after downloading, click again on button 2, which will now show the text 'Clear Memory'. This is only possible after downloading data
   (b) The access code to clear the memory is the number on your Menu key. It is convenient if you have the number included in the 'location' text, as shown (9).
3. Click to **Add or Replace a Vehicle Key**. To do so you require...
   (a) A new key.
   (b) The ID number of the key / vehicle, (1 - 2000).
   (c) The 6 digit unique ID of the button, eg: 1C563D, (usually etched on to the plastic key fob).
   (d) Then follow the prompts.
4. Click to **Delete a Vehicle Key** from the SmartFill. To do so you only require the ID number of the key / vehicle, (1 - 2000).
5. Click to **Add a Driver PIN number**. To do so you require...
   (a) The Driver ID number (1 - 2000)
   (b) The Unique driver PIN number (1000 - 65000)
   (c) Then follow the prompts.
6. Click to **Delete a PIN Number.** To do so you only require the Driver ID number (1 - 2000).
7. Click to **Show More Options**. See the next section for details.

8. Click to **Disconnect properly from the SmartFill**. This correctly terminates the connection, and provides confirmation from the SmartFill that it is diconnecting from the network. This is the correct way to end a connection with the SmartFill.
9. The ID number of your menu key - required to clear the memory after a data download.
10. Click to save the contents (if any) in the window (13) as a csv file which you can then view in a spreadsheet.
11. Click to **Exit**. This is only used if the connection to the SmartFill fails, or an error occurs. Using this exit button does not disconnect the SmartFill from the network. The SmartFill has timers to automatically close the connection, however the system may seem to be 'hanging' to an operator while it is timing out. Always use button 8 to disconnect properly.
12. This text box provides feedback about the SmartFill status.
13. This window also provides feedback, and is printable.
14. The Title bar shows the location of the SmartFill you are connected to. This is set in the Modem Setup window.

- If you clicked on **More Options**, the following window appears.

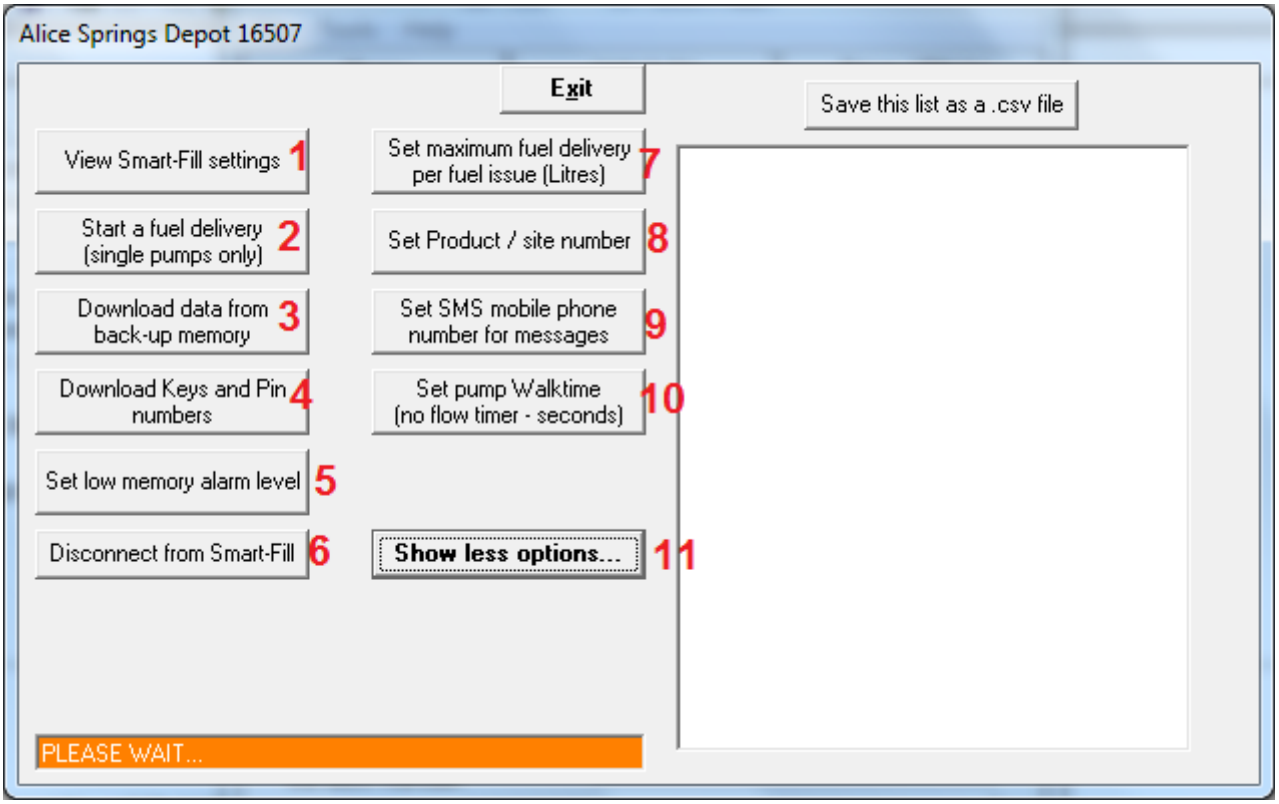


Figure 34: More Connection Options.

1. View the SmartFill settings on screen.
2. Remotely start the pump (non NMI, single hose only), you require the access code to do this.
3. Download the past 4000 fuel issues from memory. Warning - takes approximately 15 minutes.
4. Download the list of keys and PIN numbers from the SmartFill to the screen.
5. Set the low memory alarm level, at which point the SmartFill will beep and alert operators that the memory is low.
6. Disconnect form the SmartFill.
7. Set the maximum fuel delivery amount (single hose only).
8. Set the product / site number.
9. SMS number - not in use.
10. Set the walktime (no flow timeout). Single hose only.
11. Return to the first connection window.

13.3.6 Open a fuel data file.

1. Click on **'Open a fuel data file'**.
2. Double click on the required file, and it will open in your spreadsheet program.

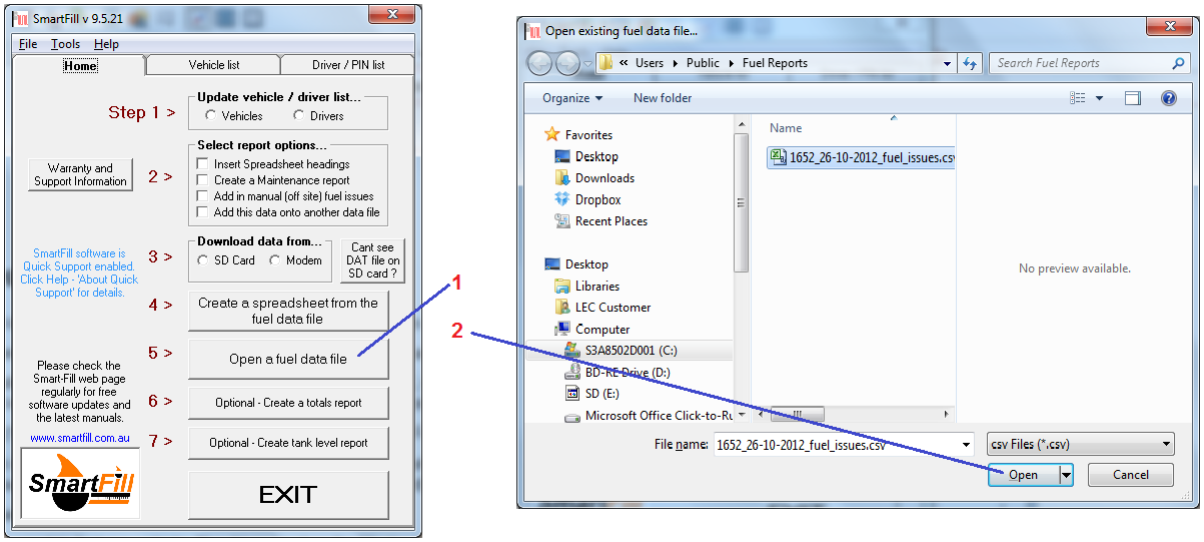


Figure 35: Opening a Data File.

A Appendix.

A.1 Smart-Fill Terminology.

Bowser. A very old brand of fuel dispenser, which has now become a loose term to describe any fuel pump / dispenser.

Comms. Communication between 2 devices, such as SmartFill and dispenser, or SmartFill and PC.

Download. The process of transferring fuel transaction data from the Smart-Fill to your PC, where the vehicle details and driver names are then attached to each fuel issue and converted into a spreadsheet, so that you can view / print / further process the data.

Driver ID number. The number (1-2000) which identifies each driver loaded into the Smart-Fill.

ibutton. The small buttons which look like a watch battery. They are used to identify each vehicle. They may be mounted either in a key fob for attaching to a key ring etc, or they can be mounted directly onto your vehicle (when a reader wand is used).

LCD. The liquid crystal display panel which you view on the Smart-Fill front door.

Master key. A key which can be used to fuel any vehicle. The driver touches the Master key to the SmartFill, and then types in the vehicle number when prompted. A normal ibutton key can be loaded in and used as a master key.

Memory Key. An ibutton with a memory capacity used to download data from SmartFill to PC.

Menu key. The ibutton key which is used by the manager to access the system to add and disable keys and PIN numbers, and to change settings etc. There is only one MENU key supplied, and It has a key tag with MENU KEY written on it. You can make 1 spare key Menu key using one of your spare ibutton keys.

Mode. A setting which the manager can set in the Smart-Fill, which is used to turn options on and off, and to configure the Smart-Fill. Eg: to turn PIN number requesting on / off.

PIN number. The unique identification number (any number from 1000 to 65000) which is used to identify each driver. PIN numbers can be linked to drivers, or to keys.with each Smart-Fill, and it should be guarded carefully.

Pulser. A device fitted to your fuel flowmeter or bowser, which provides electrical pulses to the SmartFill electronics, which it then converts to a volume of Litres.

SD Memory card. The memory card is used to download data from your Smart-Fill onto your PC. It can also be used to copy keys / pins between Smart-Fills etc.

SmartDip. A Tank Gauging system designed to incorporate directly with a SmartFill system, or as a stand alone system.

Sensor Pads. The 2 stainless steel pads on the front of the Smart-Fill. You touch the ibutton keys onto the sensor pads to log into the Smart-Fill and start a fuel issue.

Vehicle key. Another word for the unique ibutton that identifies each vehicle, see ibutton.

Walktime. Sometimes also known as a no-flow timer. This is a feature which stops the fuel pump from running for long periods of time without any fuel flow. It turns the pump off after its preset Walktime (number of seconds). This time period is adjustable by the manager.

A.2 Common Pump / Flowmeter Types.

A.2.1 Gilbarco Fleetline T334.

Figure 36: Gilbarco Fleetline / T334

A.2.2 Gilbarco Electroline Mk4.

Figure 37: Gilbarco Electroline Mk4

A.2.3 7887 Bulk Meter Register.

Figure 38: VR 7887 Bulk Meter Register

B Operating Principles.

B.1 Relay control.

In order to control access to the fuel, the SmartFill needs to only allow access following autorhisation via the vehicle ID key, and optionally, that the driver pin number is valid.
Once access is approved, the SmartFill operates a relay which is used to start a pump or open a valve etc.

B.1.1 Solid state relay (SSR).

As its name indicates, this is a solid state device, meaning it has no moving parts. The SmartFill turns on low voltage (usually 5v dc) to the primary side of the ssr, which in turn switches on a triac inside the ssr, which can switch the higher voltage, higher current supply to a pump motor etc.

NOTE - Using an ssr to switch low current loads such as a relay / contactor or a solenoid coil can cause the control system to stay on, or a relay to 'chatter' etc after the SmartFill has turned the relay off. This is due to the slight leakage of current through the ssr, which is in some cases enough to operate the relay or solenoid device. In this situation, the installer should fit a snubber device or resistor between the relay output and neutral, to bleed the current leakage to neutral.
The snubber or resistor should be sourced from an electrical wholesaler.

WARNING

Using a resistor can generate a high amount of heat, in which case the resistor needs to be located suitably for adequate cooling etc.

B.1.2 Mechanical relay.

This type of relay has a mechanical contact, which is operated by the SmartFill electronics.
This is normally used to switch low current, 5, 12 or 24 volt dc loads.

WARNING

Care must be taken to ensure that the load does not exceed the contact rating of the SmartFill relay.
This relay can be used to control...
- A higher capacity relay, to switch a 12 or 24v pump etc.
- A solenoid or motorised ball valve.
- The low voltage nozzle switch circuit on a fuel bowser.

B.1.3 Changeover relay.

This is a type of mechanical relay, but it is set up in the SmartFill to reverse the polarity of power into some types of motorised ball valves (mbv). Some later types of mbv simply use the mechanical relay, so the changeover relay has become an obsolete item.

B.2 Communication access control.

SmartFill systems are able to control bowsers which use 'Gilbarco comms', and bulk flowmeters with 'Acme CS6000' totalisers connected to them. In these applications, when the smartfill has been authorised, it sends a command to the dispenser to start the pump.
Litres amounts are sent from the dispenser to the SmartFill via comms, pulse measurement and scaling (kfactor) is done by the dispenser / Acme unit.
These systems are more commonly used when the fuel system is 'in use for trade', requiring NMI approval.

B.3 Pulse measurement.

In order to accurately measure fuel quantities, SmartFill systems count pulses transmitted by the flow meter or bowser.
Several types of pulse transmitters (pulsers) can be used with a SmartFill.
Accuracy is adjusted by the use of a 'kfactor', which is a system which can adjust the number of pulses required to measure 1 Litre of fuel.
The SmartFill kfactor can be calculated as 25000 / pulses per Litre (or 50000 / pulses on pre v9 systems).

C SmartFill Version History / Basic Spec.

Version	Vehicles	Drivers	Transactions	Memory key	SD card	Modem	Tank Gauge	LCD	Control
Pre 7	200	200	200	Printer Only				2x16	Relay
7.2	200	200	200	•				2x16	Relay
8	1000	1500	500	•				2x16	Relay
Pre 9.4	1000	1500	500	•		•		2x16	Relay
9.4	1000	1500	500	•		•	•	4x20	Relay
9.6	2000	2000	3000		•	•	•	4x20	Relay
10.5 NMI	2000	2000	3000		•	•	•	4x20	Comms
11.5 NMI	2000	2000	3000		•	•	•	4x20	Comms

D SmartFill Part Numbers and Applications.

Part No	Description	NMI Approved ?	Bowser / Pulser / Meter / Comms Type	Reference Pictures	Enclosure Part No / Size
SF1001	v10.6 Acme DC Single	YES	Pulse output Meter, Eg: MacNaught / Trimec / Flomec.		A1026 300h 200w 150d
SF1001-1	v10.6 Acme DC Single	YES	LC Flowmeter, uses Acme Adapter and Pulser Kit.		
SF1002	v11.6 AC Gilbarco Comms	YES	Gilbarco Comms.		
SF1005	v11.6 AC Gilbarco Comms	NO	Gilbarco Comms.		
SF1006	v9.6 AC Single Hose	NO	Pulse output Meter, Eg: MacNaught / Trimec / Flomec.		
SF1007	v9.6 AC 2 Hose	NO	Various.	N/A	
SF1008	v9.6 AC 3 Hose	NO	Various	N/A	
SF1009	v9.6 AC 4 Hose	NO	Various	N/A	
SF1010	v9.6 DC Single Hose	NO	Pulse output Meter, Eg: MacNaught / Trimec / Flomec.		