

SmartDip v7.3 setup / installation guide.

April 18, 2013

Contents

1	Safety warnings.	4
2	Features.	4
3	Pre-ordering requirements.	5
3.1	Information required prior to order.	5
3.2	Tank Sensor Selection.	6
4	Warranty Information / Installation Requirements.	7
4.1	Special notes for use with generators.	7
4.2	Commissioning / Installation report.	8
5	Specifications.	9
5.1	Electrical.	9
5.2	Alarm Relays.	9
5.3	System accuracy.	9
5.4	SmartDip Version History.	10
6	Electrical Connections and Hardware Installation.	11
6.1	SmartDip Circuit Board (SmartDip006.pcb) Layout.	11
6.2	Power supply wiring 240vac supply.	12
6.3	Tank sensor electrical connections.	13
6.4	Tank sensor installation to tank.	14
7	Normal Use and Operation.	15
7.1	Start-up / initialization time.	15
7.2	Displayed data.	15
7.3	Dipping tanks via mobile phone SMS.	15
7.3.1	To dip the tanks on demand, via SMS from any mobile phone.	15
7.3.2	To have a daily dip SMS sent to a mobile phone at a preset time.	15
7.3.3	SMS Message structure.	16
8	System Configuration Guide.	17
8.1	When integrated with a SmartFill.	17
8.2	Important notes before you start.	17
8.3	<u>Quick Setup Guide.</u>	18
8.4	Setup process.	19
8.5	Rectangular tank setup.	21
8.6	Horizontal Cylinder Setup.	21
8.7	Vertical Cylinder Setup.	22
8.8	20 Point Chart Setup.	22
8.8.1	Entering the 20 point chart.	23
8.9	Sensor Range setting.	24
8.10	Repeat a tank setup.	25
9	Key-press functions.	26
9.1	Press / hold 2 to change a product density.	26
9.2	Press / hold 3 to view / edit the daily SMS time.	26
9.3	Press / hold 4 to view the phone signal strength.	26
9.4	Press / hold 5 to view the daily SMS number stored in the system.	26
9.5	Press / hold 6 to view tank setup details.	26
9.6	Press / hold 7 to view each tank sensor current flow in mA, and the level in mm being seen by the SmartDip.	27
9.7	Press / Hold 8 to adjust a tank level offset.	27
9.8	Press / Hold ENT to Edit tank settings or turn a tank on / off.	27
10	Modem / SMS setup.	27

11 Troubleshooting.	27
11.1 Incorrect tank level readings.	27
11.1.1 How to adjust the tank accuracy.	28
11.1.2 Density Adjustment Formula.	28
11.1.3 Is the accuracy error due to incorrect density, or incorrect offset ?	28
11.1.4 Tank Adjustment (level offset).	28
11.2 SMS messages not operating.	29
12 Maintenance.	29
12.1 Regular Maintenance.	29
12.2 Deleting system settings.	29

List of Tables

1 Pressure Sensor Range Chart	6
2 SmartDip Version History	10

List of Figures

1 SmartDip006 Board layout	11
2 SmartDip Mains Power Supply Connections.	12
3 Tank Pressure Sensor Connections.	13
4 Tank Pressure Sensor Installation.	14
5 Quick Setup Guide	18

1 Safety warnings.

- SmartDip systems **MUST NOT be used or located in flammable zones, or used to monitor flammable liquids.**
- The sensors and enclosures used are **NOT rated for use in hazardous / flammable zones.**
- The SmartDip system **MUST NOT be used as the sole source of pump or level control in a critical application**, where failure could result in tank overflow or a pump running dry etc.
- Additional control methods such as float switches etc **MUST** be used in critical applications for control purposes.
- Tank vents must be clean and large enough to provide free flow of air without creating any pressure or vacuum inside the tank. Pressure or vacuum in the tank has a large affect on the accuracy of the system, due to the use of pressure sensors for level measurement.

2 Features.

- Monitors up to 8 tank levels.
- Can be integrated into the latest SmartFill fuel management systems.
- User configuration of tank details, using the tank dimensions or 20 point chart.
- Common Low and High alarm relays.
- 'DipMail' daily tank / site report can be sent to up to 6 emails (optional prepaid extra by arrangement, and subject to 3G phone network availability at the site).
- Daily SMS of tank dips to a user definable mobile phone, at a user defineable time of day, (if a modem is fitted).
- A user defineable 10 character Location of the system is included in SMS messages
- Tank dips may be viewed on demand at any time of day from any mobile phone, via SMS message.
- Tank dips may be viwed on a pc screen, if the SmartDip is combined in a SmartFill system.
- Three tank shapes are automatically calculated from user defined dimensions...
 - Rectangular.
 - Horizontal Cylinder.
 - Vertical Cylinder.
- A 20 point chart can be manually entered from dipstick measurements.

3 Pre-ordering requirements.

3.1 Information required prior to order.

In order to provide the best equipment for your particular installation, the SmartDip manufacturers require some basic site / tank details.

1. How many tanks are to be gauged.
2. What products are in each tank.
3. Are flammable / corrosive liquids involved.
4. What power supply is available.
5. How high is each tank (in mm).
6. Are the sensors to go through the top of the tank (as in self banded / double skinned tanks).
7. Are the sensors to go in a drain valve or external pipework etc.
8. Is the system stand alone, or part of a SmartFill system.
9. Is a phone modem required.
10. If using the DipMail service...
 - (a) The SFL of each tank.
 - (b) Product description for each tank.
 - (c) Low alarm level of each tank.
 - (d) Time of day for email.
 - (e) Email addresses of up to 6 recipients.

3.2 Tank Sensor Selection.

- The accuracy of the SmartDip system, greatly depends on using the correct range sensor, to match the tank / fluid height.
 - To select the correct sensor for each individual tank, you need to find the range required.
1. Measure the internal height of the tank
 2. Obtain the density of the fluid.
 3. Multiply the tank height by the density.
Eg; Height 2400mm * density 0.840 = 2016 mm minimum range sensor required.
 4. Select the lowest possible range sensor from the table below, which is equal to or above the range required (an R2500 sensor suits perfectly for our example).
- Select the lowest range sensor you can, for each tank, for higher accuracy.
 - 2 columns are provided which show the maximum height for each sensor when used with diesel fuel at density of approximately 0.840, and water at density of 1.0.

Sensor Part Number	Maximum Height for Diesel @ SG approx 0.840	Maximum Height for Water @ SG 1.0
RW2500 RS2500	2,976 mm	2,500 mm
RS3500	4,166 mm	3,500 mm
RW4000	4,761 mm	4,000 mm
RS5000	5,952 mm	5,000 mm
RW10000	11,904 mm	10,000 mm

Table 1: Pressure Sensor Range Chart

4 Warranty Information / Installation Requirements.

- The SmartFill / SmartDip manufacturers warrant each system against manufacturing faults or defects for 12 months from the date of purchase on manufacturer's sales invoice.
- Every system is manufactured with all possible due care in design and assembly, and with good intent.
- Due to the remote nature of most of this type of equipment, the following warranty terms are strictly adhered to...
 - Warranty repair labour is only covered at the manufacturer's premises (located in Western Australia).
 - The warranty period commences from the date of purchase (invoice date) from the manufacturer to the end user or reselling agent.
 - Smart-Fill parts are warranted for a period of 12 months.
 - Smart-Fill repair labour is warranted for a period of 12 months, at the manufacturers premises only.
 - 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.
 - Any faults caused by electrical disturbance, poor installation quality, misuse or neglect will not be covered by any manufacturer warranty.
 - An on-site warranty may be able to be negotiated with your supplier. The manufacturer does not provide an on site warranty option.
 - No warranty will apply if commissioning documents and photographs (as outlined in the commissioning document supplied with each system), are not sent to the manufacturer within 21 days of the system installation.
 - 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.
 - If these conditions are deemed unacceptable by the distributor / client / end user, then the client must contact their supplier to arrange a resolution.

4.1 Special notes for use with generators.

- No warranty is available for SmartFill / SmartDip systems powered by portable generators, without an individual approval for the particular installation from the SmartFill manufacturers.
 - These approvals are issued only for each single installation, they are not a blanket approval for more than 1 system.
 - A separate approval is required for each individual system being powered by a portable generator.
 - To enable the manufacturers to warrant any system connected to a portable generator, the system MUST be designed so that it is not possible for the generator to be started or stopped while the SmartFill is electrically connected to its power supply.
 - The SmartFill 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 stops.
 - At the very minimum a power failure relay and current sensing relay will be required.

4.2 Commissioning / Installation report.

- The installation and commissioning of your SmartDip is crucial to its long term performance.
- Therefore it is a warranty / support requirement that the installer completes and returns the documentation below for each installation.
- Please check with your SmartDip installer that the documentation has been completed and returned to the manufacturer.

1. SmartDip serial No _____.
2. Date of installation _____.
3. Location _____.
4. Installed by Company _____, Name _____.
5. Sim card phone number _____.
6. SMS to mobile number _____.
7. Type of sealant used on internal sensor fittings _____.
8. Conduit / glands / cable sealed YES NO.

9. Tank setup details...
(For tank type, 1 = Rectangular, 2 = Horizontal Cylinder, 3 = Vertical Cylinder, 4 = 20 point chart).

	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5	Tank 6	Tank 7	Tank 8
Type								
Width or Diameter								
Height								
Length								
Sensor range								
Product Density								
Sensor location, internal / external								
Tank offset, mm up/down								
Check Accuracy. Error in mm								

10. Photo's provided of...
 External SmartDip unit. Internal SmartDip wiring.

5 Specifications.

5.1 Electrical.

- Operates on 240vac or 24vdc power supply (must be specified on order).
- Current draw...
 - 240vac, less than 100mA.
 - 24vdc, 2A max if modem fitted.
- Sensor type, 4-20mA pressure sensor, various pressure ranges (tank heights) available, see section 3.2 on page 6

5.2 Alarm Relays.

- Both the Low and High Alarm relays, are normally open, voltage free contacts.
- Each contact is rated at 3A, 30vdc.
- Cycle Time.
 - Because of the time taken for the system to rotate thru a possible 8 tanks before updating the alarm relays, the system should NOT be used as a pump cutout where a tank could possibly run out, or overflow in the time between sampling each tank.
 - Care must be taken to fully understand the filling / draining rates of the tank, and the sampling times of the system to ensure that an unsafe condition does not occur due to the time delay of activating the relays.
- Relay Operation...
 - The Low alarm relay will close when any one of the tanks is at or below the low alarm level, unless that tank is turned Off.
The relay contact will remain closed until the tank level increases above the low alarm setting.
 - The High alarm relay will close when any one of the tanks is at or above the high alarm level, unless that tank is turned Off.
The relay contact will remain closed until the tank level falls below the high alarm setting.
 - If you have a tank which is in a low alarm state, you will not be able to detect another tank going low, unless you turn that tank Off.
A future SmartDip version will have an optional 'add on' relay board which will provide a separate low / high alarm relay contact for each tank.

5.3 System accuracy.

System accuracy is greatly dependant upon the quality of installation work, such as...

- You should expect accuracy to within approx +/- 20mm, when the system is installed correctly.
 - Accuracy will be affected by external factors when using a pressure sensor.
 - * The fluid density setting must suit the fluid in the tank. Contact the fluid manufacturer for actual density.
 - * The density of diesel fuel can change seasonally, so this may have an affect on accuracy.
 - * Performing a tank offset adjustment to suit the height of the pressure sensor above or below the floor of the tank.
 - * Sloping of tanks.
 - * Adequate tank ventilation. You can not use a tank venting system which maintains any pressure or vacuum in the tank when using a pressure sensor for measurement.
 - * Good quality wiring / cable terminations.
 - Pressure sensor accuracy is quoted as 0.25% of span. Which equates to 10mm on a 4 Metre (R4000) sensor. However external factors as listed above will affect the overall accuracy of the system.

5.4 SmartDip Version History.

Version Number / Date	Maximum No of tanks	SMS on demand from any mobile	Daily SMS to mobile	Location included in SMS	Comms to SmartFill	Sensor mA shown in settings	RS232 D out on C
6 and below (Pre Oct 2011)	8	Yes	No	No	Yes, ver x.x.2	No	No
7.0 (Oct 2011)	8	Yes	Factory set to 9am	Factory set on request	No	No	No
7.1 (Nov 2011)	8	Yes	Yes	Yes	Yes, ver x.x.4	Yes	Yes
7.2 (Mar 2012)	8	Yes	Yes	Yes	Yes, ver x.x.4	Yes	Yes

Table 2: SmartDip Version History

1. The Low Level SMS Alert is sent only when the SmartDip is a stand alone unit, ie: it is not connected to a SmartFill system.

6 Electrical Connections and Hardware Installation.

6.1 SmartDip Circuit Board (SmartDip006.pcb) Layout.

The figure below shows major components on the SmartDip board. These items will need to be known for wiring connections and service checks / adjustments.

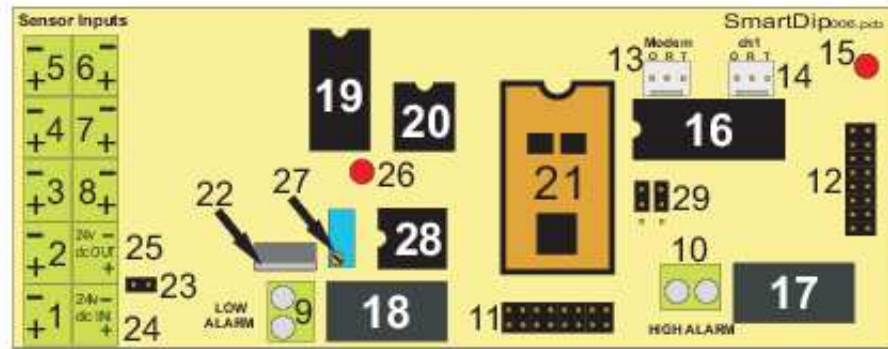


Figure 1: SmartDip006 Board layout

- 1 to 8 Pressure sensor connections.
 “+” is the 24vdc power supply to the pressure sensor.
 “-” is the signal return from the sensor (4-20mA).
- 9 Low alarm relay terminals, normally open contacts, closed in alarm state.
- 10 High alarm relay terminals, normally open contacts, closed in alarm state.
- 11 Ribbon cable connection to power supply, or SmartFill board.
- 12 Ribbon cable connection to display / keypad panel.
- 13 Modem - RS232 connection to phone modem, 0v (Common) - tx - rx from left to right.
- 14 Ch1 - RS232 connection, data stream out for PLC etc, 0v (Common) - tx - rx from left to right.
- 15 5v Power indicator LED.
- 16 20 Pin RS232 Driver chip. Must be fitted for modem or ch1 comms to operate.
- 17 High Alarm Relay.
- 18 Low Alarm relay.
- 19 16 Pin Mpx Chip.
- 20 8 Pin Eeprom memory chip, contains tank / phone settings etc.
- 21 24 Pin Main processor chip.
- 22 Metal tab on voltage regulator, (5v reference voltage measured between here - 24v connection).
- 23 Test Clip. - **IMPORTANT** - Leave this clip on one pin only for normal use.
 - Fit clip to both pins, and remove sensor wires to tank 1 to simulate a sensor connection to tank 1.
 - The system should show a reading for tank 1 while the test clip is in place.
- 24 24vdc power input from power supply.
- 25 24vdc power output to modem etc.
- 26 24vdc Power indicator LED.
- 27 5v Reference voltage adjustment screw. DO NOT TOUCH.
- 28 8 Pin ADC chip.
- 29 Link clips to ch1 rs232 output. Must be fitted to stream data to PLC etc through ch1 output.

6.2 Power supply wiring 240vac supply.

This diagram applies only to stand alone SmartDip systems.

On SmartFill integrated systems, the SmartFill documentation shows mains power supply wiring information.

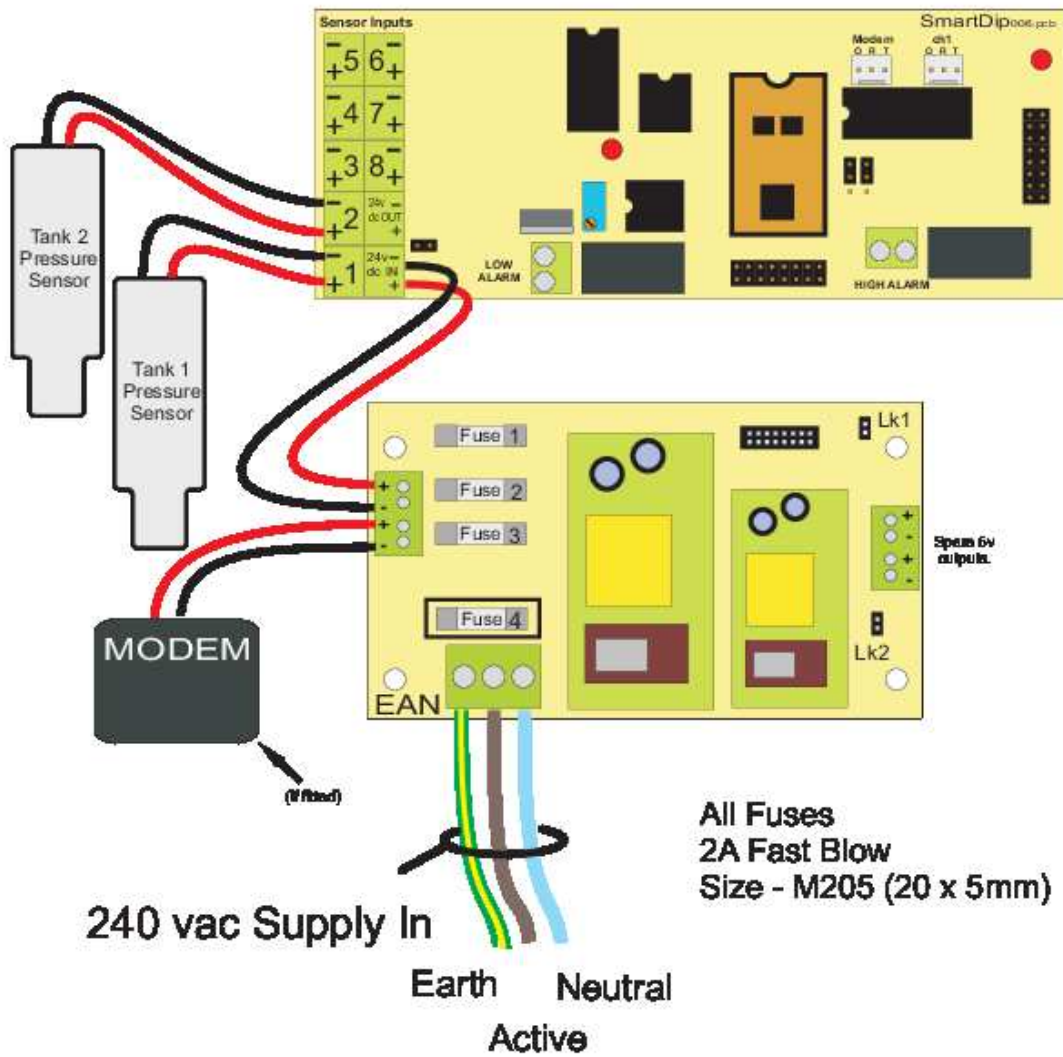


Figure 2: SmartDip Mains Power Supply Connections.

6.3 Tank sensor electrical connections.

This diagram shows pressure sensor connections.

Note that there are 2 models of sensor used (RW range and RS range), and each is wired differently to the sensor.

Pressure Sensor Connections.

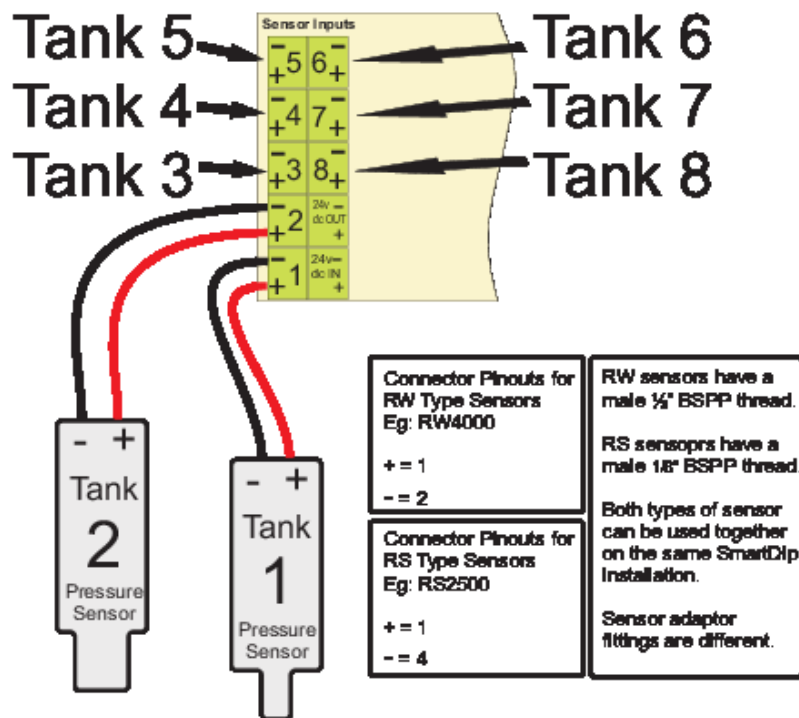


Figure 3: Tank Pressure Sensor Connections.

6.4 Tank sensor installation to tank.

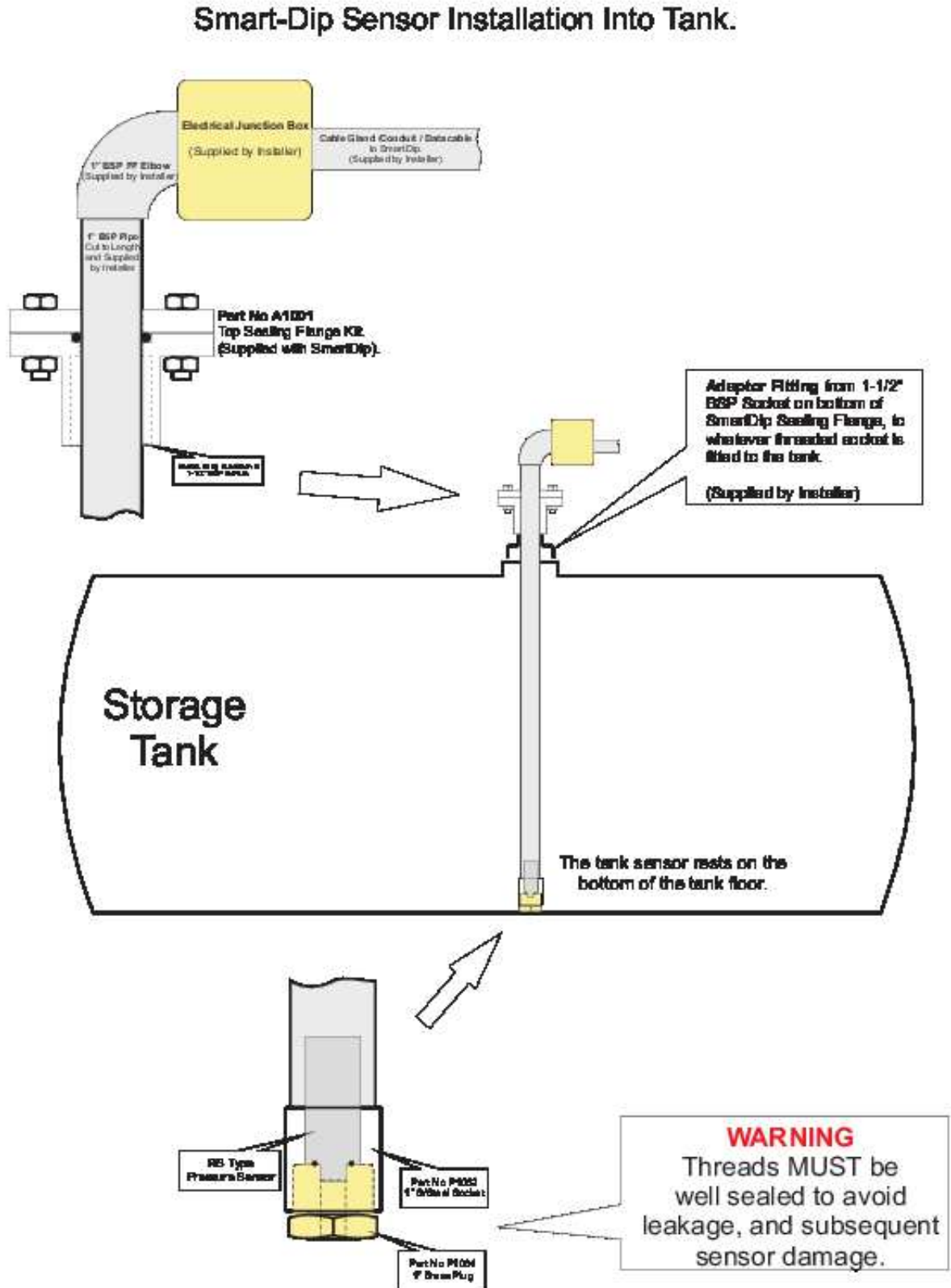


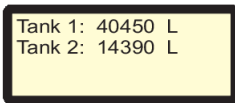
Figure 4: Tank Pressure Sensor Installation.

7 Normal Use and Operation.

7.1 Start-up / initialization time.

- Please note that the start-up time may take up to 2 minutes, depending on the number of active tanks.
- This start-up period occurs at power on, and after a tank setting has been changed, while it re-initialises settings.

7.2 Displayed data.



- When the system is operating normally, the tank levels are shown as above on the display.
- If a tank is in an alarm state, either low or high, the alarmed tank will show LO or HI on the display .

7.3 Dipping tanks via mobile phone SMS.

- Providing that your SmartFill / SmartDip system has a 3G modem fitted, you can dip the tanks from any mobile phone, or you can have a daily SMS message sent to a mobile phone.
- You can only program one phone receive the SMS.

7.3.1 To dip the tanks on demand, via SMS from any mobile phone.

- Send a text message with a few random characters such as “abc” etc to the phone number of the sim card in your SmartDip / SmartFill system.
 - You may be able to simply send a blank message, but some mobile phones such as iPhone may not send a blank message.
 - Wait a few minutes and you should receive a reply from the system.

7.3.2 To have a daily dip SMS sent to a mobile phone at a preset time.

- In the setup menu of the SmartDip, set the time of day, and the mobile phone number, plus the location name, (the name must be exactly 10 characters long), see section ?? on page ??.
- If the SmartDip is integrated into a SmartFill system...
 - Set the time and phone number in the SmartDip.
 - Send the system a message to dip the tanks. This will then load the time of daily SMS into the SmartFill (from the SmartDip).
NOTE - When a SmartFill is used, the time is set with hours only, minutes are ignored.
 - You also need to turn the 'DAILY SMS' option ON in the SmartFill MODE setting, see the latest SmartFill version 9.5 manual.

7.3.3 SMS Message structure.

The reply SMS message appears as shown below, with 1234 being the serial number of SmartDip / SmartFill system, and the SmartDip location on the following line.

SmartDip 1234
KALGOORLIE
Tk1 20540
Tk2 4073 LO
Tk3 56130 HI
Tk4 OFF
Tk5 OFF
Tk6 OFF
Tk7 OFF
Tk8 OFF

- If '**ERROR**' is reported for any of the tanks, then the tank may be completely empty, or a fault has occurred and should be investigated.
- If the tank shows **OFF**, then the tank is turned off in the system setup. It may have been turned off to remove an alarm state until the tank is refilled.
- As shown above, a tank will show **LO** or **HI** if it is in a Low or High level alarm state.

8 System Configuration Guide.

8.1 When integrated with a SmartFill...

If the SmartDip system is integrated in with a SmartFill Fuel Management System, you need to connect the SmartDip to the Keypad / Display panel before you can configure the SmartDip settings.

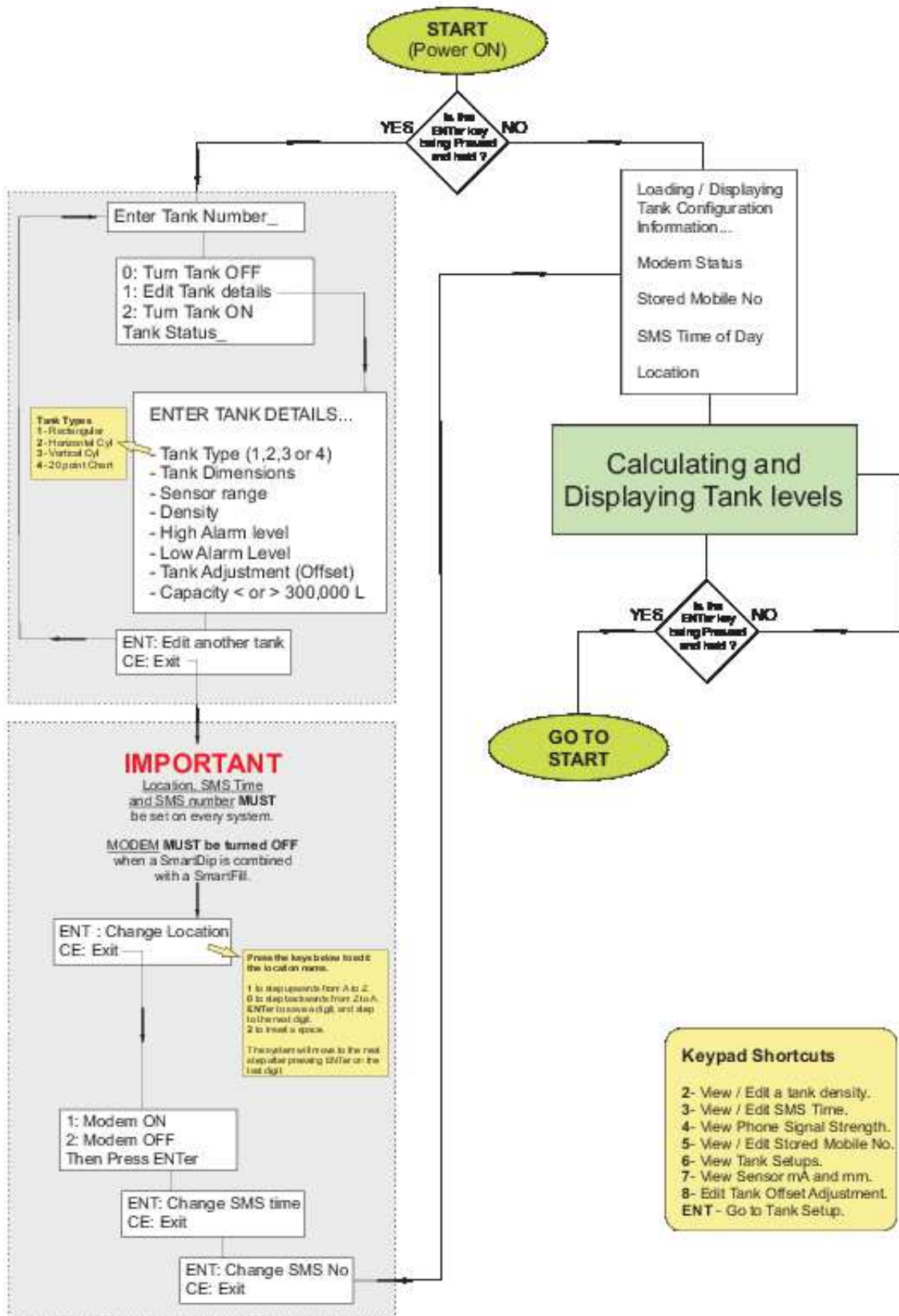
1. IMPORTANT - Power the system off.
2. Unplug the ribbon cable connected to the right hand side of the SmartFill board.
3. Plug the cable onto the 16 pin connector on the right hand side of the SmartDip board.
4. Check that the plug is on correctly.
5. Power the systemTank 1 on.

8.2 Important notes before you start.

- **Please note.** There may be delays of up to a minute or so, at some times during the setup and initialization process. This is due to the large amount of data that is being checked and processed.
- If you are entering a 20 point tank chart, first read the start of section (8.8) on page 22, before continuing. Then return here to start the setup process.

8.3 Quick Setup Guide.

Smart-Dip Version 7.2 Setup and Operation Flowchart.



8.4 Setup process...

- To access the setup menu, Press and Hold the **ENT** key on the keypad, until the system beeps and 'Please Wait' shows on the display. Please be patient, as this may take a minute or so.

Please Wait . . .

- This screen will appear while the system loads data from its stored memory, this may take a minute or so.
- The very first time you set the system up you **MUST** clear the memory. To do this press the "9" key when prompted and then hold down the enter key in response to "Are you sure?" prompt until the screen says "Clearing"

SmartDip ver 7.0
Enter To Add Tank_

- The SmartDip Version number is shown on the screen.
- Press **ENTER** to either add a new tank, or to edit an existing tank setup.
- **Press CE/C to exit tank setup, and go to Modem / Phone Settings**, section ?? on page ??.

Enter Tank No : █

- Enter the tank number (1 to 8) and then press **ENTER**.

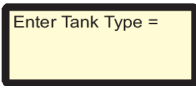
0. Turn Tank OFF
1. Edit Tank Details
2. Turn Tank ON

- **0.** Turns a tank OFF, ignoring its dip levels and alarms. You might do this if...
 - The tank is out of service.
 - The tank level is low or high, and you wish to turn the alarm relay off, to allow other tank alarms to be noticed.
- **1.** Adds a new tank, or edits an existing tank setup.
- **2.** Turns a tank back ON after it has previously been turned off.
- Select the required option and then press **ENTER**...

1: Rectangular
2: Horizontal Cyl
3: Vertical Cyl
4: 20 Point Chart

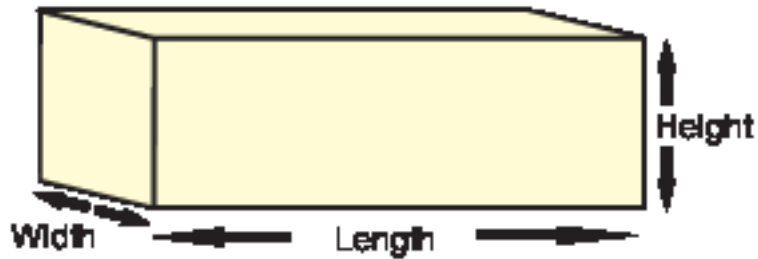
- This screen is simply showing you the 4 different tank type numbers.
- Choose the tank type from 1 to 4.

- Do not enter the number until the next window appears.
1. **Rectangular.** Select 1 to enter the tank dimensions in mm for length, height and width, for square or rectangular tanks.
 2. **Horizontal Cylinder.** Select 2 to enter the tank length and diameter in mm.
 3. **Vertical Cylinder.** Select 3 to enter the tank height and diameter in mm.
 4. **20 Point Chart.** This will enable you to enter a 20 point chart, using the existing tank dipstick. You only need to enter the tank diameter which you measure from the dipstick. The system will then calculate the 20 measuring points in mm, and ask you to enter the Litres at each corresponding depth in mm.
- 'STORED TANK TYPE' will show on the bottom of the screen for a brief period. If the tank details have been set previously, this is simply showing you the previous setup type.



- Select the tank type from the previous options, then press ENTER. Then for specific tank setup information, go to section...
 - 8.5 for Rectangular tank on the following page.
 - 8.6 for Horizontal Cylinder on the next page.
 - 8.7 for Vertical Cylinder on page 22.
 - 8.8 for 20 point dipstick chart on page 22.
- If a screen appears saying "STORED TANK TYPE = x", this is because you are editing an existing tank.
- It will also give you the option to press ENT to change the tank type.
- Press CE to exit if you don't wish to change the tank settings.

8.5 Rectangular tank setup.



PLEASE ensure you use internal tank measurements.

Enter Length =
■

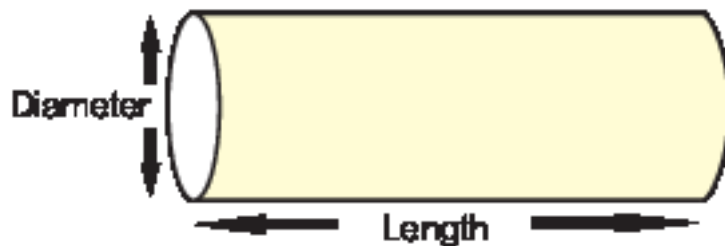
Enter Height =
■

Enter Width =
■

- You will be prompted in 3 stages to enter the tank length, height and width in mm. Press ENTER after each entry.

Now go to section 8.9 on page 24.

8.6 Horizontal Cylinder Setup.



PLEASE ensure you use internal tank measurements.

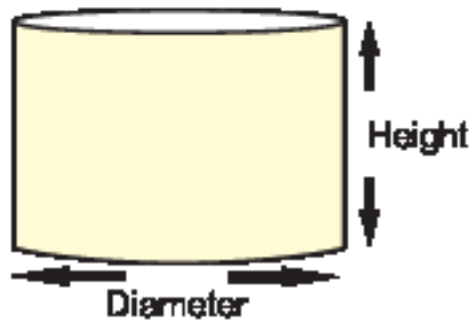
Enter Length =
■

Enter Diameter =
■

- You will be prompted in 2 stages to enter the tank Length and the tank Diameter in mm. Press ENTER after each entry.
- PLEASE ensure you use internal tank dimensions.
- If the tank has dished ends, add 1/3 of the depth of one dish to the tank length.
Eg. if each dished end is 150mm deep, just add 50mm to the overall tank length.

Now go to section 8.9 on page 24.

8.7 Vertical Cylinder Setup.

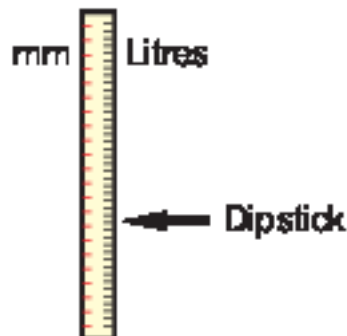


PLEASE ensure you use internal tank measurements.

- You will be prompted in 2 stages to enter the tank Diameter and the tank Height in mm. Press ENTER after each entry.
- PLEASE ensure you use internal tank dimensions.

Now go to section 8.9 on page 24.

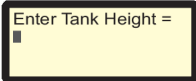
8.8 20 Point Chart Setup.



- The 20 point chart feature allows you to use the SmartDip on almost any shaped tank, without requiring the tank dimensions.
- You do require the tank dipstick or a known tank chart for the tank, and you also need to know the tank capacity (not the SFL, the full capacity).
- You will also require a tape measure, pen and paper.
- After completing the 4 requirements below, you can start the tank setup process at section 8.4 on page 19.
 - Remove and dry the tank dipstick.
 - Measure and record the tank diameter, using the full mark on the dipstick (not the SFL).
 - Record the tank capacity (full capacity, not SFL).
 - Have the dipstick and tape measure ready.
 - Complete the above four steps before continuing.

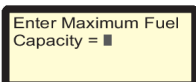
8.8.1 Entering the 20 point chart.

- The SmartDip system will automatically tell you at which points to measure for the 20 point chart.
- In order to do this, the system first needs to know the tank height.



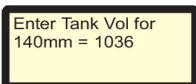
Enter Tank Height =
█

- Enter the tank Height in mm, then press ENTER.



Enter Maximum Fuel
Capacity = █

- Enter the full capacity of the tank in Litres, then press ENTER.
- NOTE - This is the full capacity of the tank as marked on the dipstick, Do Not enter the SFL amount.



Enter Tank Vol for
140mm = 1036

- You will now be shown where to measure the Litres on the dipstick.
- In the above example the first point is at 140mm from the bottom of the dipstick, in the example screen above we have equated 140mm to equal 1036 Litres.
- Use your tape measure to measure from the bottom of the stick, and note the corresponding Litres at that point on the dip stick.
- Type in the amount of Litres at that measurement (as accurately as possible), and then press ENTER once to set.
 - Press ENTER again to permanently save the Litres, or...
 - Press CE/C to change the Litres.
 - The screen will then show you the next point to measure.
- Repeat this process until all 20 points have been entered.
 - The system will pause for a short time after 20 entries, to save the data to memory.
- Now go to section 8.9 on the following page.

8.9 Sensor Range setting.

Enter Sensor Range =
■

- The Sensor range is simply a range in mm of water that the sensor can measure. For best accuracy, you choose the lowest possible range sensor for each tank.
- The pressure sensor supplied for each tank will be marked with a sensor range (each tank may use a different range sensor).
- Commonly used sensor ranges are 2500, 4000 and 10000.
 - The number relates to the maximum pressure it can measure, (or maximum height of water, in mm).
 - 2500 = max 2500mm of water, (or approx 2.97 Metres of diesel at density of .840).
 - 4000 = max 4000mm of water, (or approx 4.7 Metres of diesel at density of .840).
 - 10000 = max 10000mm of water, (or approx 12 Metres of diesel at density of .840).
 - Larger sensors can be used on smaller tanks (with a loss of accuracy), but a sensor range smaller than the tank height can NOT be used.
- Enter the sensor range for the tank being set up, and then press ENTER.

Enter Density = ■

- The fluid density must be entered for the product in the tank.
 - A fluid density of 0.840, is entered as 840, and a density of 1.000 is entered as 1000.
 - If you are unsure of the product density, please consult the supplier of the product in the tank.
 - Some sample approximate densities are listed below.
 - * Diesel fuel: 840.
 - * Water: 1000
 - * Lubricants and other products: Consult the manufacturer, as the densities vary considerably.
- Enter the product density, then press ENTER.

High Alarm Level =
■

- The High Alarm level should be set to the Safe Fill Level (SFL) of the tank (in Litres), and NEVER higher than the SFL.
 - The generally accepted SFL level is 90% of tank capacity, however, you should consult the tank manufacturer etc if you are unsure.
 - When any of the tank levels are at, or above the High Alarm level, the High Alarm relay will be activated.
- Enter the High Alarm Level in Litres, then press ENTER.

Low Alarm Level =
■

- The low alarm level can be set to whatever amount suits the owners requirements.
 - The Low Alarm relay will be activated (contact closed) while any of the activated tanks are at or below their Low Alarm Level.
- Enter the Low Alarm level in Litres, then press ENTER.

Tank Adjustment
 0: Add
 1: Subtract
 Then Press ENT

- The tank level in mm may be offset to allow for slope, or for the tip of the pressure sensor not being at exactly floor level of the tank.
- **UNSURE ?** - If you are unsure of the distance between the pressure sensor tip and the floor of the tank, and the sensor is fitted down through the top of the tank, resting on the floor, then **select 0** now, and set the **offset to 25 mm** in the following step.
- If the sensor tip is **higher** than the tank floor, then you need to add to the offset (**select 0**).
- If the sensor tip is **lower** than the tank floor, then you need to add to the offset (**select 1**).
- Then press ENTER

Enter offset in mm =
 -

- Enter the amount in mm that you would like to offset the level by.
- Enter 25 if you are unsure as explained in the previous step.
- Then press ENTER

Tank Capacity
 0: Less than 300K
 1: Greater than 300K
 Then Press ENT

- The system needs to know if the tank capacity is less or greater than 300,000 Litres, due to some internal calculations.
 - If you are unsure of the tank size, contact the SmartDip manufacturers with the tank dimensions for support.
- Enter 0 or 1 for the tank size, and then press ENTER.
- If you are entering a 20 point chart, you will now be prompted to enter the 20 settings at 8.8.1 on page 23.

8.10 Repeat a tank setup.

ENT: Edit Another TK
 CE: Exit_

- This completes the setup for the tank.
 - Press ENT if you would like to add or edit another tank, or...
 - Press CE to step to the Modem setup options.

9 Key-press functions.

- **PLEASE NOTE** - You may need to Press and Hold a key for a minute or so to view setups. Keep pressing the key until 'PLEASE WAIT' appears on the display.

9.1 Press / hold 2 to change a product density.

NOTE - If the SmartDip is fitted into a SmartFill system, with the SmartFill connected to the modem, the minutes will be ignored, and the SMS will be sent on the hour.

- After a short period, TO BE COMPLETED.

9.2 Press / hold 3 to view / edit the daily SMS time.

NOTE - If the SmartDip is fitted into a SmartFill system, with the SmartFill connected to the modem, the minutes will be ignored, and the SMS will be sent on the hour.

- After a short period, the existing SMS time setting should be displayed.
- Press ENT when prompted if you wish to change the time, or CE to Exit.
- After you enter the 4th digit, the system will automatically reset.
- NOTE - If a SmartFill is fitted and the SMS time is changed in the SmartDip board, please dip the tanks via sms on demand, or CE on the keypad, to update the SmartFill settings.

9.3 Press / hold 4 to view the phone signal strength.

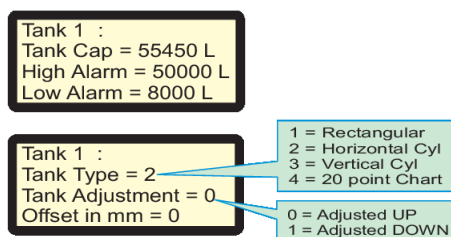
- After a short period, the signal strength should be displayed.
- A normal reading is usually between 10 and 25.
- A reading of 101 indicates an error, possibly a sim card or phone provider account fault.

9.4 Press / hold 5 to view the daily SMS number stored in the system.

- The stored mobile phone number will be displayed on the screen.
- To change the number, see section ?? on page ??

9.5 Press / hold 6 to view tank setup details.

- If a tank has a 20 point chart, the 20 points of mm and Litres will be shown first. This will be in 5 pages of information.
- The individual tank setups will then be displayed, with 2 pages of information per tank, see examples below...



9.6 Press / hold 7 to view each tank sensor current flow in mA, and the level in mm being seen by the SmartDip.

- This is a useful diagnostic tool, and will assist the manufacturers if support is required.
- The current in mA (milliamps) for each active tank will be displayed on the screen, along with the level in mm.

9.7 Press / Hold 8 to adjust a tank level offset.

- Go to the offset guide at section 8.9 on page 25.

9.8 Press / Hold ENT to Edit tank settings or turn a tank on / off.

- Press and Hold ENTER until "Please Wait" appears on the display. (Remember it can take a minute or so of holding the ENTER key).
- When 'Enter To Add Tank' appears, press ENTER.
- When prompted, enter the desired Tank Number.
- A screen will appear with 3 options.
- Choose your required option, then press ENTER.

10 Modem / SMS setup.

- Press / Hold ENTER to start the setup process.
- When 'Enter To Add Tank' appears, press CE/C, and then wait until the Modem setup screen appears.
- Go to section ?? on page ??.

11 Troubleshooting.

11.1 Incorrect tank level readings.

The following items will affect the accuracy of the system.

- Incorrect tank dimensions may have been entered. You can view the tank setup at section ?? on page ??
- Incorrect tank type entered at setup time.
- Incorrect product density.
- Incorrect sensor range entered at setup time.
- Incorrect sensor range used in the tank, use the lowest range possible for the best accuracy.
- Tank offset adjustment has not been set, or is set incorrectly.
- A reference voltage may require adjustment on the SmartDip board. NOTE - This must only be performed by a competent technician, using a high quality multimeter.
- The tank vent may be partially blocked, or closed. The tank MUST be free venting.
- Fluid may have leaked into the sensor tube if has not been sealed correctly at time of installation.

11.1.1 How to adjust the tank accuracy.

IMPORTANT - The tank MUST be at least 2/3 full before adjusting the accuracy. If you adjust accuracy when the tank is low, any amount of error will increase as the tank level rises.

1. Check that the tank is at least 2/3 full.
2. Check that all tank settings have been entered correctly.
3. ENSURE that the tank offset is set correctly.
4. Adjust the product density in the tank, until the SmartDip shows the same Litres as the tank dipstick. See the formula below for adjusting the density to suit the product in the tank.

11.1.2 Density Adjustment Formula.

During this calculation, you need to think in mm, not Litres.
To adjust the density correctly, you need to know 3 things...

1. The tank Level in mm, measured accurately with a tape measure.
2. The tank level in mm, measured by the SmartDip (Press / Hold 7 to view mm).
3. The tank density that has been set in the SmartDip for the product.

Using the above 3 numbers, calculate the new density as follows...

Density / Dipstick mm * SmartDip mm.

Eg: Existing Density is 840, Dipstick mm is 1815, SmartDip mm is 1800.

$840 / 1815 * 1800 = 833$.

In this example, you now set the density to 833.

Repeat this process until the system is as close as possible.

11.1.3 Is the accuracy error due to incorrect density, or incorrect offset ?

IMPORTANT :

If the system is reading incorrectly, measure and record the amount of error on the dipstick in mm (NOT Litres).

Do this when the tank is approximately 1/4 full, and do this again when the tank is full.

- If the error (in mm) is the same when the tank is low, as when the tank is full, then the error can be corrected by performing a tank offset adjustment. It is important that the tank offset (mm from sensor tip to tank floor) is set correctly.
- If the error amount (in mm) changes when the tank is low, and when full, then the error will most likely be with the density setting.

Make adjustments to the settings when the tanks are as full as possible, not when the levels are low.

This especially applies to the density adjustment.

11.1.4 Tank Adjustment (level offset).

You can manually offset / adjust the level of each tank, you should do this to...

- Allow for a slightly sloping tank.
- Allow for the pressure sensor tip being above or below the floor level of the tank.

To adjust the offset...

- Press and Hold 8 on the keypad, until 'Please Wait' appears on the screen.
- Enter the desired tank number, then press ENTER.
- Now go to the Tank Adjustment screen at section 8.9 on page ??

11.2 SMS messages not operating.

The following are common causes of SMS / SIM card problems.

- No sim card in modem.
- Sim card inserted incorrectly.
- Sim card inserted with power on, MUST be inserted with power off.
- Sim card in the modem has not had PIN number requesting turned off.
 - To do this, you must put the sim card into a mobile phone, and use the phone to turn the PIN requesting OFF, in the security settings. You will need to know the PIN number of the sim card to do this.
- Inadequate phone signal available in the area.
- Phone account settings incorrect, ie: SMS may be turned off etc. Check with the phone account provider.
- No mobile number entered into SmartDip.
- Modem not turned ON.
- Time of day for SMS not set.
- If the SmartDip is combined with a SmartFill, the SmartFill will normally be connected to the SmartFill board. In this case, you need to set Phone number / Location etc in the SmartDip, but you MUST turn the MODEM OFF in the SmartDip setup. (Not SmartFill).

12 Maintenance.

12.1 Regular Maintenance.

The SmartDip system is relatively maintenance free. There are no items which would require regular maintenance. However the following items should be checked on an annual basis.

- Check that the tank vents are clean and free flowing.
- Check the integrity of the enclosure, for water / dust leaks etc.
- Clean the outside of the enclosure with warm, weak soapy water, and dry with a clean cloth. DO NOT use solvents to clean the unit.
- Check that all wiring / conduits are in good order, and cable glands etc are sealed.
- Check the SmartFill dips against the tank dipsticks regularly.

12.2 Deleting system settings.

This operation deletes all tank setup and SMS phone number data from the memory chip.

You might do this if you were re-installing the SmartDip into a new location.

The program in the main processor is unchanged, it is simply the tank settings etc that are erased.

- **WARNING - The settings will be completely erased, and can NOT be recovered after deleting.**
- Press / Hold ENTER until 'Please Wait' appears on the display.
- Immediately Press / Hold 9 until 'Are you sure ?' appears on the display.
- Immediately Press and Hold ENTER until 'Clearing' appears on the display.
- The settings have now been completely erased.