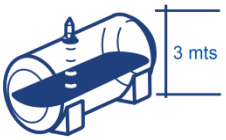
APOLLO SMART PRODUCT MANUAL

1) INTRODUCTION

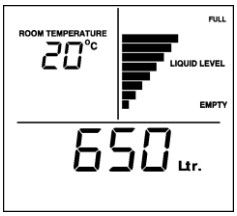


Thank you for selecting the **Apollo Smart** Heating Oil Energy Monitor. This revolutionary home energy monitoring system allows today's energy and environmentally conscious consumers to monitor and track their heating oil consumption, its costs, and the heating systems environmental impact through carbon emissions, on a daily, weekly, monthly, and annual basis.

The **Apollo Smart** product from Dunraven Systems consists of the **Apollo Smart Transmitter** and the **Apollo Smart Monitor**. The Apollo Smart Transmitter is easily installed on your oil storage tank to measure the level of the oil. It transmits the oil level information wirelessly to the Apollo Smart Monitor which may be located in a convenient location inside your home.

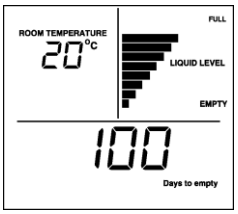


The Apollo Smart Transmitter uses ultrasonic technology to measure the distance from the Transmitter on top of the tank to the surface of the liquid in your oil tank. As the amount of oil in your tank decreases the distance measured increases accordingly. The distance information or 'ullage' is transmitted wirelessly to the Apollo Smart Monitor.



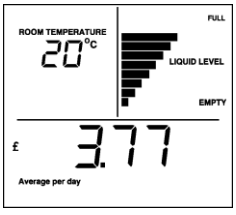
Litres and % fuel

Once programmed with information about your oil tank's shape and size, the Apollo Smart Monitor calculates and displays the amount of fuel remaining in your tank in litres or as a percentage of the tank capacity. In addition (as oil is consumed over time) the Apollo Smart Monitor calculates and displays usage information including the average amount of litres used per day, per week, over the last 30 days, and over the last 365 days



Days to Empty (DTE)

As the Apollo Smart Transmitter continuously measures and transmits the oil level, the Apollo Smart Monitor retains this information allowing it to 'learn' historical heating system usage patterns and so predict the '**Days to Empty**' for your home. With this information you can ensure that you order your oil at the correct time – not too soon, and more importantly, not too late.

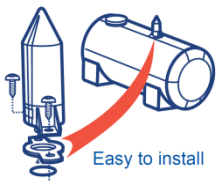


Costs

By entering the cost you pay for your oil during the setup process of your Apollo Smart Monitor and subsequently when you take deliveries of oil (if the price has changed), the Apollo Smart can present your oil usage in terms of its costs, i.e. average cost per day and per week, and the cost for the usage over the last 30 days and 365 days.

Environment

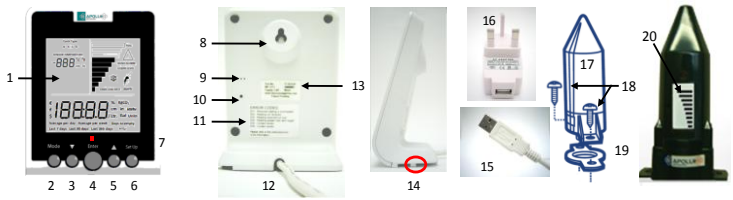
Similarly, the Apollo Smart Monitor can display your oil usage in terms of the associated production of CO_2 emissions, as the equivalent quantity of $KgCO_2$ emitted per day, per week, the last 30 days and 365 days.



The Apollo Smart Transmitter fits into the standard 32mm aperture found on most modern oil storage tanks and is suitable for use with almost any plastic or metal tank up to 3m tall, including Bunded and Single Skin Oil tanks. If your tank is a bunded tank, ensure that you mount the Apollo Smart Transmitter on the inner tank.

As part of the installation the Apollo Smart Transmitter and Monitor are 'synchronised' together to ensure there is no interference from other nearby transmitters.

2) APOLLO SMART – FEATURES AND FUNCTIONS



Apollo Smart features

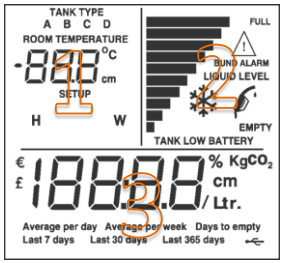
1	LCD Display	11	Error code information
2	MODE key	12	Power/data cable
3	DOWN key	13	Manufacturing information
4	ENTER key	14	Location feature (see STEP 3 of the installation guide)
5	UP Key	15	USB connector
6	SETUP Key	16	Mains power plug
7	Alarm Red LED	17	Apollo Smart Transmitter
8	Wall mount feature	18	Self-tapping screws x 2
9	Beeper aperture	19	Weather seal (Gasket)
10	RESET access (pressing reset erases all historical data.	20	Apollo Smart Transmitter oil level display

Apollo Smart Key Functions

MODE	When in NORMAL mode press **MODE** to move between the current and the historical information screens.
△	Press **UP** to move between screens when in NORMAL mode. Use it to increase a setting when in SETUP mode.
ENTER	The **ENTER** key is used only in SETUP mode. It is used to save the setting shown on the display and then move automatically to the next SETUP number.
▽	Press **DOWN** to move between screens when in NORMAL mode. Use it to decrease a setting when in SETUP mode.
SETUP	Press **SETUP** for 3 seconds to enter SETUP. When in SETUP, press **SETUP** to exit from SETUP mode.
▽ + △	When in NORMAL mode, by pressing together and releasing, the screen will flash the current tank configuration for 20 seconds. Press any key to return to NORMAL mode.

LED

The red light above the ENTER key flashes when there is an Alarm condition (see section 6) and on receiving an RF signal from the Apollo Smart Transmitter



DISPLAY - SYMBOLS & INDICATORS

The Apollo Smart contains a display that conveys a variety of information during normal use and during its initial setup and configuration for use with your oil tank. The display contains three sections (1, 2, & 3) as indicated:

1 - Used for SETUP and displays SETUP number, and in normal use displays room temperature.

2 - Tank information including a visual bar-graph of the oil level in the tank.

3 - Information about the remaining usable oil in litres or as a %, the 'Days to Empty', and the average and cumulative use of oil in litres, cost and $KgCO_2$. Time is also displayed here.

Apollo Smart Monitor and Transmitter Display Symbol reference

1	**TANK TYPE**	Indicates the Tank Type being selected
	A, B, C	A, B, C are types of tank shapes (see diagrams in section 5)
	ROOM TEMPERATURE	The value displayed is the Room Temperature
		Numeric display - Shows the Room Temperature in normal mode e.g 20. Shows the Setup mode number when in setup mode, e.g. SETUP mode 3
	°C	The value displayed is temperature in degrees Celcius
	cm	The value displayed is in centimetres
	SETUP	Setup mode is active
	H	The value displayed is the tank height
	W	The value displayed is the tank width
2		**Apollo Smart Monitor Display:** Bargraph indicator of liquid level - each bar represents 10% of tank height
		Apollo Smart Transmitter Display: Tanks 1m in height or greater - each bar represents 1/10th of the top meter of the tank. Tanks less than 1m in height - each bar represents 1/10th of a metre
	FULL	Indicates the 'Full' level of the bargraph indicator
	LIQUID LEVEL	Indicates the bargraph is showing the liquid level
	EMPTY	Indicates the 'Empty' level of the bargraph indicator
	BUND ALARM	When flashing there has been a leak into the 'Bund' (double skinned tanks). The 10 bars and the RED LED will also be flashing at the same time.
	TANK LOW BATTERY	The Apollo Smart Transmitter battery needs to be changed.
		Flashing - The remaining liquid level in the tank is at 10% or below of tank height. (Appears on both the Apollo Smart Monitor and Transmitter)
	⚠	Flashing - There is a problem with the RF signal from the Apollo Smart Transmitter. (Appears on both the Apollo Smart Monitor and Transmitter)
	❄	The temperature is close to or below the limit of operation of the Apollo Smart Transmitter - the information accuracy may be affected.
3	**£**	The value displayed is in Sterling pounds
	€	The value displayed is in Euro
	%	The value displayed is the % of usable oil remaining in the tank.
		Numeric display - used to show numeric values and the time. A numeric value is not available to be displayed when '---' is shown.
	$KgCO_2$	The value displayed is of Kg of CO_2 (carbon emissions)
	cm	The value displayed is in centimetres
	Ltr.	The value displayed is in Litres
	/ (Ltr.)	The value displayed is per (litre)
		USB data activity.
	AVERAGE PER DAY	The value displayed is the average per day based on the last 7 days usage
	AVERAGE PER WEEK	The value displayed is the average per week based on the last 14 days usage
	DAYS TO EMPTY	The value displayed is the estimated number of days of oil remaining in the tank. It is computed by dividing the volume of usable oil left in the tank by the current daily average use.
	LAST 30 DAYS	The value displayed is the estimated usage over the last 30 days
	LAST 365 DAYS	The value displayed is the estimated usage over the last 365 days

3) PRODUCT INFORMATION

a) DEFINITIONS/GLOSSARY

Ullage	The distance from the Apollo Smart Transmitter to the surface of the liquid in the tank.
Outlet	The connection point from which oil is drawn from your tank to feed to your boiler. It is typically located 8 cm above the bottom of your tank in one of the sidewalls. Oil below the outlet level is not usable. For Top Discharge tanks, the feed point is typically located at 8cm above the bottom of the tank.
Vent	A small chimney like feature on the top of your tank. It allows the air within the tank to be released when the tank is being filled.
Brimful Tank Capacity	The maximum amount of liquid that can fit in the tank.
Nominal Tank Capacity	Normally 95% of the brimful capacity. This is the maximum amount to which your tank should be filled according to OFTEC and EN standards.
Usable Capacity	The nominal capacity of the tank minus the amount of oil that is below the outlet or discharge point. If the oil level falls to the level of the outlet, your tank is effectively empty.
Matching	The process of uniquely matching the Apollo Smart Transmitter with the Apollo Smart Monitor.
Days to Empty (DTE)	A prediction of the number of days in which the oil level will reach the outlet or the discharge point. The DTE is calculated based on the your recent usage patterns.
RF	Radio Frequency - the tank level measurements are conveyed wirelessly to the Apollo Smart Monitor from the Apollo Smart Transmitter using RF transmissions
$KgCO_2$	Kilogrammes of Carbon dioxide.
SETUP mode	SETUP mode is used to configure the Apollo Smart Monitor for your oil tank.
LEARN mode	LEARN mode is used to match the Apollo Smart Transmitter with the Apollo Smart Monitor
NORMAL mode	NORMAL mode is for day to day use of your APOLLO SMART. In this mode it displays current and historical information.
CURRENT information screens	Screens in NORMAL mode that display information about the current status of the amount of oil remaining in your tank in Litres, as a %, and the DTE.
HISTORICAL information screens	Screens in NORMAL mode that display information about your historical usage of oil in terms of litres, cost, and environmental impact.

b) TECHNICAL SPECIFICATIONS

Tank Size
Minimum Depth : 0.5m
Maximum Depth: 3m

CE

Display
Multi-function LCD display including:

- 10 bar-graph level indication on both Apollo Smart Monitor and Transmitter*
- Display of various current and historical values (Apollo Smart Monitor only)

Display control with five control buttons.
Red LED for low level indication at 5% or less of usable fuel remaining.
Audible alarm sounds every hour on the hour when the tank level is low.

Max communication distance
Typically 150m in normal 'line of sight' conditions

Power Supply
Apollo Smart Transmitter - Transmitter: 3V LiMn cell, CR2450
Apollo Smart Monitor - Receiver: 5V DC (40mA)
Apollo Smart Monitor – Back up battery: 3V LiMn cell, CR2450

Mains Power Supply (included) for Apollo Smart Monitor
150V-240V, 50-60 Hz, meets EN60335

Battery Life
Apollo Smart Transmitter: 5 years (estimated life)
Apollo Smart Monitor – Receiver memory back-up battery: 3yr if device is not plugged in**

Wireless com:
433MHz FM transmission (EN300-220)

Dimensions
Apollo Smart Transmitter: 140m x 70mm x 40mm
Apollo Smart Monitor: 120mm x 90mm x 50mm

Max and Min Operation (Transmitter)
Operating temperature range: -10°C to +60°C
Operating Humidity : 0 -95% non-condensing

Hole size for fitting transmitter:
32mm diameter

* The Apollo Smart Transmitter and Apollo Smart Monitor bar-graph displays may differ (see Display symbol reference table).

** This device contains a small battery to keep time during power cuts. If the device is left unpowered for an extended period then the battery will deplete.

c) Notes:

- Please retain this product manual and the installation guide. It contains practical instructions, technical specifications and safety precaution warnings you should know about.
- The technical specifications for the Apollo Smart, the contents of this manual and the images herein are subject to change without notice.
- The contents and images in this manual are subject to copyright and may not be reproduced without the permission of Dunraven Systems Limited.
- When used according to recommendations, the Apollo Smart monitors the oil level in your tank and calculates and presents figures relating to the remaining oil, the historical usage, and the related monetary and environmental costs. The Apollo Smart must not be used as verification of a 'Weights and Measures' certified dispensing meter.
- Patents pending or covered by one of the following patents: S2003/0882, EP2131164 (A1), US2006261966 (A1), US7277020 (B2), IE20030882 (A2) , S2008/0466, US2009/0303059 A1

- The Apollo Smart Monitor is intended to be connected to a power source continuously. It contains a small battery to keep time during power cuts. If the Apollo Smart Monitor is left unpowered for an extended period then the battery will deplete and information may be lost. When you are not using your domestic oil heating system, you may unplug the Apollo Smart and store it until you wish to use your heating again. Its back-up battery and internal clock keep track of the days as they pass. When you next use it, on starting to use your heating again, the Apollo Smart will continue monitoring your oil usage, and calculating the financial cost and environmental impact.
- When the Apollo Smart has been unplugged and is plugged in again, it will start up in 'Lrn' mode. Simply press any key to exit.
- When you are receiving an oil fill, the Apollo Smart Transmitter cannot receive a reliable echo due to turbulence within the tank and may cause the Apollo Smart Monitor to temporarily display some error messages. Should the tank be filled above the recommended 95% this will obstruct the transmitter signal until the oil level drops below 120mm from the transmitter. The transmitter will be unable to send accurate readings during this period.
- The Apollo Smart owner should note that the first fill amount of oil into a tank will differ from the amount shown on the display. This is due to the fact that the Apollo Smart Monitor displays the volume of Usable oil available. The Apollo Smart Monitor in its calculations makes an allowance of 8cm of unusable oil in the bottom of the tank due to the location of the bottom outlet or the top discharge pipe.
- Not suitable for pressurised containers. Only use on tanks vented to the atmosphere.
- Only access the Reset Switch if instructed by customer service. Pressing the reset will erase all historical data.
- Changes in temperature can result in contraction and expansion of the tank and hence can affect the tank capacity. Such changes may affect your readings.

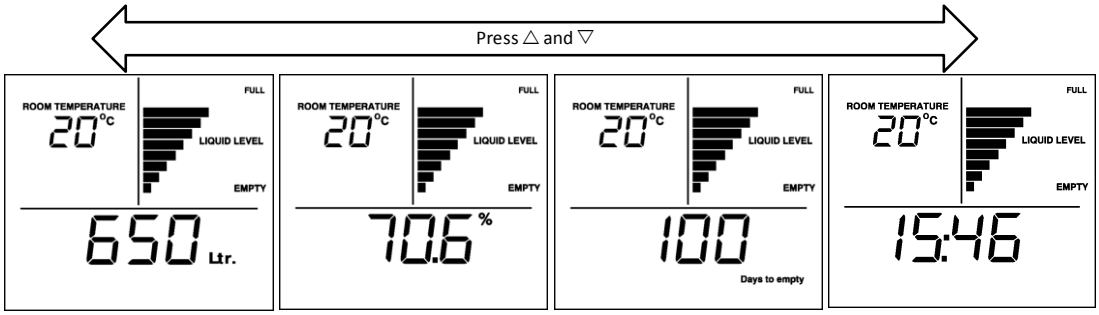
d) GENERAL PRODUCT SAFETY, CARE AND USE GUIDE LINES

- To ensure that you use your product correctly and safely, please read the warnings, safety precautions and notes below regarding use of and caring for your Apollo Smart Monitor and Transmitter.
- Do not use this product where the use of radio frequency products can cause malfunction in the control devices of other equipment i.e. hospitals, aircraft, etc
- Do not subject the product to excessive force, shock, dust, temperature or humidity.
- The LCD panel behind the display lens is made of glass, and may break if the unit is dropped, impacted or subjected to shock.
- Take special care when handling a damaged display, as the liquid crystals can be harmful to your health.
- Keep the product away from heat sources i.e. radiators, stoves, heaters, etc
- Do not use the Apollo Smart Monitor in or near water or in high moisture areas i.e. Bathroom
- Do not tamper with the Apollo Smart Monitor's internal components. This will invalidate the warranty.
- Do not attempt to repair the product yourself. Contact the retailer or our Customer Service Department.
- Do not dispose of old batteries as unsorted municipal waste, do so in accordance with your local waste disposal regulations.
- When disposing of this product do so in accordance with your local waste disposal regulations
- Do not scratch hard objects against the Apollo Smart display as this may cause damage
- Do not replace batteries in a potentially explosive atmosphere.

4) DISPLAY SCREENS

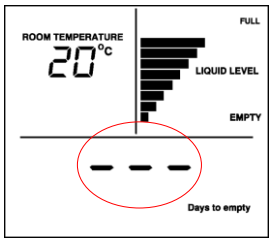
There are two types of information displayed on the Apollo Smart Monitor:

CURRENT information screens– used in normal mode to show the current status of the oil level in your tank. Change between the 'Ltr.', '%', 'Days to empty', and Clock screens using the △ and ▽ keys.



For approximately 1 week after the Apollo Smart is installed, it collects data so that the 'Average per day' value may be calculated. During this period the screen will flash '---' when showing 'Days to empty'. (In the picture 'flashing' is indicated by the red circle).

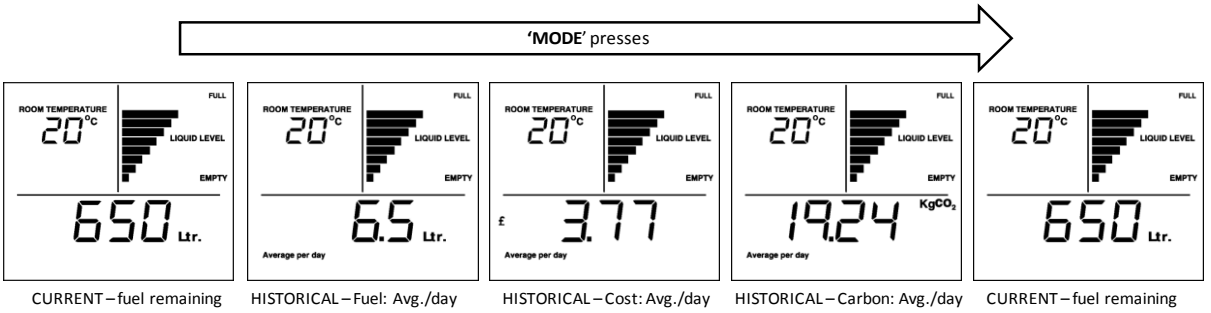
After the 1 week period has passed, the display may continue to show '---' (but not flashing). This indicates that a meaningful value could not be calculated. This may occur in periods when there is no (or extremely low) usage. The '---' may be displayed in any of the HISTORICAL information screens under these conditions.



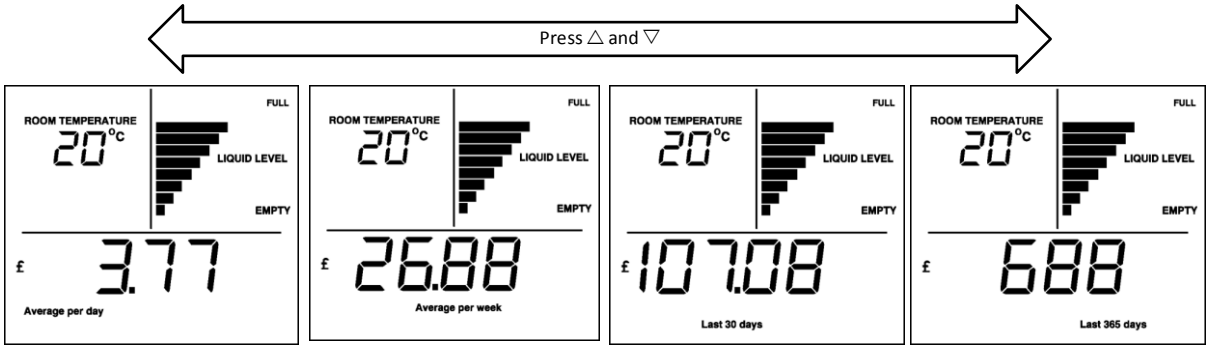
The screen may also show '---'if the Apollo Smart Monitor had been unplugged for some time. In this case '---' means that it has no recent reading from the transmitter with which to display a value on the

screen. Depending on how long it has been unplugged the screen will revert to normal after a period from a few hours up to a maximum of 1 week.

HISTORICAL information screens showing 'Fuel usage – Litres', 'Fuel usage – Cost' and 'Fuel Usage – Carbon'. Presssing **MODE** and △/▽ accesses these screens.



CURRENT – fuel remaining | HISTORICAL – Fuel: Avg./day | HISTORICAL – Cost: Avg./day | HISTORICAL – Carbon: Avg./day | CURRENT – fuel remaining

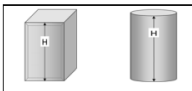
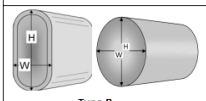
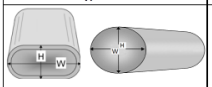


Fuel cost: Avg./day | Fuel cost: Avg./week | Fuel cost: Last 30 days | Fuel cost: Last 365 days

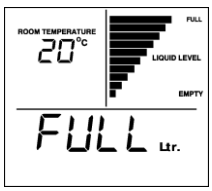
The Apollo Smart Monitor will automatically return to the CURRENT information screen after 30s with no key presses within the HISTORICAL information screens.

5. APOLLO SMART - TANK SETUP

To calculate the volume in your tank the Apollo Smart Monitor needs to know the shape of your tank. There are three basic shapes as illustrated. Identify the shape that is closest to the shape of your tank. Each Apollo Smart Monitor is supplied with the default settings as shown. The Apollo Smart Monitor must then be configured to your own tank's dimensions (see installation guide). Minimum and maximum allowable values for tank dimensions are shown in this table.

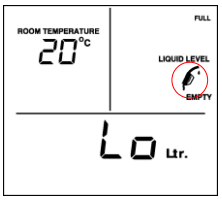
	Tank Capacity (Ltr.)			Tank Height (cm)			Tank Width (cm)		
	Low limit	Default	High Limit	Low limit	Default	High Limit	Low limit	Default	High Limit
 Type A	300	1000	10,000	50	100	300	N/A	N/A	N/A
 Type B	300	1000	10,000	Tank Width	100	300	50	50	Tank Height
 Type C	300	1000	10,000	50	50	Tank Width	Tank Height	100	300

6. APOLLO SMART LEVEL ALARMS/INDICATIONS



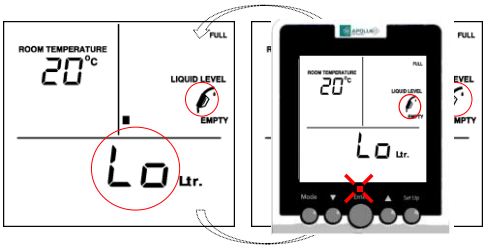
When the level in your tank is below 12 cm from the top of the tank, i.e. bottom of the Apollo Smart Transmitter, the main display will show 'FULL'. This will occur when there are 10 bars showing on the bar-graph.

When the tank level falls to within 14cm of the bottom of the tank the 'bowser' symbol will flash.

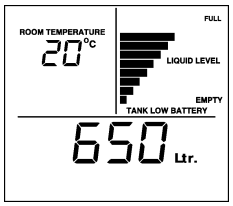


When the tank level is such that there is below 10% of the usable volume of oil left in the tank, the CURRENT information screen alternates between showing the 'Ltr.' (or % or DTE) and 'LO'. If the level then drops such that there is below 5% of usable oil left:

- 'LO' is displayed constantly on the CURRENT information screens.
- The buzzer sounds 5 times an hour at the top of the hour, i.e. 10:00, 11:00, 12:00, 13:00, 14:00...
- The RED light flashes. This continues until there is an oil delivery and the level rises.



7. APOLLO SMART TRANSMITTER BATTERY CHANGE



If the battery in the Apollo Smart Transmitter needs to be changed the display will provide advance warning by showing the 'TANK LOW BATTERY' text below the bar-graph.

- Remove the Apollo Smart Transmitter from the tank and take it to a safe location
- The battery can be accessed by removing the 4 self-tapping screws from the base of the unit.
- Remove the old battery noting the orientation ('+' mark facing outwards), and replace it with a new battery, 3V CR2450
- Re-assemble, ensuring the O-ring is undamaged and secured in position.
- Re-locate the transmitter on the tank.



There is no need to re-synchronise the transmitter with the monitor when the transmitter battery is changed.

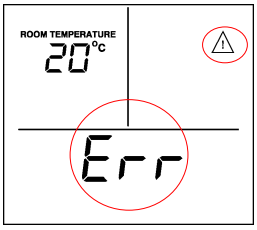
Disposal

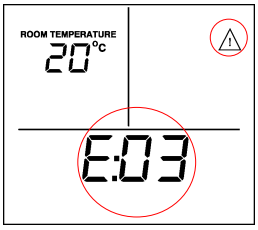
The crossed out dustbin on the packaging indicates that this product and its battery shall not be treated as household waste. Proper disposal will help prevent potentially negative consequences for the environment and human health. For more detailed information about recycling of this product or battery, please contact your local Recycling centre or the shop where you purchased the product.

8. TROUBLESHOOTING

If the Apollo Smart Monitor does not receive or cannot understand the RF signal from the Apollo Smart Transmitter an error message will be displayed on the Apollo Smart Monitor**.** The error message appears as an alternating screen showing 'Err' and 'E:0?' where ? is a number.

Error codes are listed on a label on the rear of your Apollo Smart Monitor.





Error	Description	Suggested remedy
E01	Received reading is inconsistent	• Check the transmitter is vertical on the tank. • Check positioning of the transmitter (ensure the transmitter is not too close to the tank sides or internal obstructions). • Ensure that the transmitter is not too tightly attached to the tank. • Ensure that the tank is not overfilled and that the bottom of the transmitter is clean.
E02	Received Reading not received after 6 hours	• Check the transmitter is within range of the monitor. Try and relocate the monitor to a position that is nearer a window, remember that the transmitter communicates with the monitor by use of an FM signal and moving the monitor from possible metal obstructions can improve the signal • Check that there is no metal object such as a van, truck or that there is nothing in the fabric of the building, that may deflect the signal. Wait for an hour to see if you have a new reading. • Ensure the monitor is not too close or obstructed by other electrical appliances.
E03	Received Reading received but void	• Check positioning of the transmitter (ensure the transmitter is not too close to the tank sides or internal obstructions). • Ensure that the transmitter is not too tightly attached to the tank. • Ensure that the tank is not overfilled i.e. there is a minimum of 120mm free space between the transmitter and oil level. • Ensure the bottom of sensor is clean. • If a bund tank, ensure the transmitter is located on the inner tank.
E04	Received Reading greater than tank height	• Check the tank height and ensure this information is correct on the monitor, press the △ and ▽ keys together to view your tank configuration. If height is incorrect, enter the setup mode by pressing SETUP for 3 secs, press ENTER until you reach screen 5 and adjust the height by using △ and ▽ keys. Press ENTER to save. Press SETUP to exit Setup mode. Await 3 hours for updated readings. • Check the transmitter is vertical and positioning of the transmitter (ensure the transmitter is not too close to the tank sides or internal obstructions
E05	Contact Vendor	• This is a hardware fault and requires contact with the vendor
E06	Contact Vendor	• This is a hardware fault and requires contact with the vendor