Product Manual

TEK – 603
Eco-Oil-Monitor for Oil or Water

Contents

1 Introduction

Thank you for selecting the TEK-603 Eco-Oil Monitor product. 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.
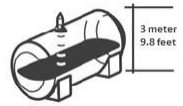
The Eco-Oil Monitor comprises a **Sensor Transmitter** and the **Eco-Oil Monitor**.

The Transmitter sensor, which can be easily installed on your oil storage tank, measures the level of oil in your tank. It wirelessly transmits the oil-level information to the monitor, which should be placed in a convenient location within your home.
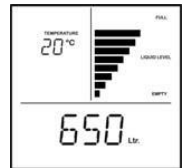
Liters or Gallon and % Fuel

Once programmed with information about your oil tank's shape and size, the monitor calculates and displays the amount of fuel remaining in your tank in liters/gallons or as percentage of the tank capacity and as oil is consumed over time, it calculates and displays usage information including the average amount of liters/gallons used per day, per week, over the last 30 days and over the last 365 days.

Days to Empty (DTE)

As the transmitter continuously measures and transmits the liquid level, the monitor retains this information allowing it to 'track' historical heating system usage patterns and so predict the 'Days to Empty' for your home, thus ensuring that you order 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 and subsequently when you take deliveries of oil (if the price has changed), the monitor 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.
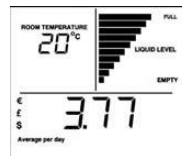
Environment

The monitor can also 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 transmitter fits into the standard 32mm or 2" aperture found on most modern oil storage tanks and is suitable for use with almost any plastic or metal tank up to 3m/ 9.8ft tall, including bunded and single skin oil tanks. If your tank is bunded, you must mount the transmitter on the inner tank.
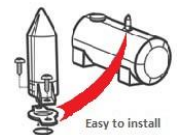
The transmitter sensor and monitor are 'synchronized' together during the setup process to ensure that there is no interference from other nearby transmitting sensors.

2 Features and Functions
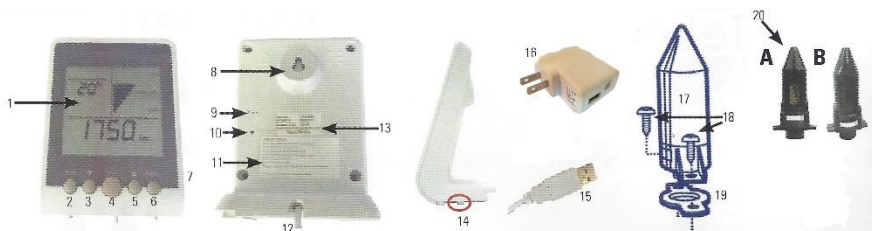
Eco Oil Monitor Features

| 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 Installation Guide)
5	UP key	15	USB connector
6	SETUP key	16	Power supply
7	Red Alarm LED	17	Sensor Transmitter
8	Wall mount feature	18	2 x Self-tapping screws
9	Beeper aperture	19	Weather seal (Gasket)
10	RESET button access	20	Two different sensor types (display)

Eco Oil Monitor 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 settings shown in the display and then move automatically to the next SETUP number.
▼	Press **DOWN** to move between screens when in NORMAL mode. Use it to increase 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 seciont 6) and on receiving an RF signal from the transmitter sensor, as well as a low-level condition.

DISPLAY – SYMBOLS & INDICATORS
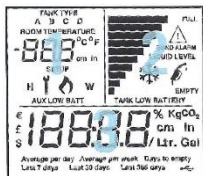
The Eco-Oil Monitor contains a display that conveys a variety of information during normal use and during its initial setup and configuration for use with your oil tank. The display contains three sections as indicated in the diagram.

1 Used for SETUP and displays SETUP number and in normal use to display room temperature.

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

3 Records the remaining useable oil in liters/gallons or as %, 'Days to Empty' and the average cumulative use of oil in liters/gallons, cost and KgCO2. Time is also displayed here.

Eco Oil Monitor and Display Symbol Reference

1	**TANK TYPE**	Indicates the tank type being selected.
	A, B, C	A, B, C are types of tank shapes (see diagram).
	20	Numeric display – shows the room temperature in normal mode i.e. 70.
	3	Shows the SETUP mode number when in SETUP mode, i.e. SETUP mode 3
	°C / °F	The value displayed is the temperature in degrees Celsius or Fahrenheit.
	cms./ins.	The value displayed is centimeters or inches.
	SETUP	SETUP mode is active.
	H	The value displayed is the tank height.
	W	The value displayed is the tank width.
2		**Monitor Display:** Bar graph indicator of liquid level – each bar represents 10% of tank height.
	1M	**Sensor Transmitter Display (Only with TEK – 687):** Tanks 1m/3.3ft in height or greater – each bar represents 1/10th of the top 1m/3.3ft of the tank. Tanks less than 1m/3.3ft in height – each bar represents 1/10th of 1m/3.3ft.
	FULL	Indicates the 'Full' level of the bar graph indicator.
	LIQUID LEVEL	Indicates the bar graph is showing the liquid level.
	EMPTY	Indicates the 'Empty' level of the bar graph 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 sensor transmitter battery needs to be changed.
	(symbol)	Flashing – The remaining liquid level in the tank is at 10% or below of tank height. (Appears both, on the transmitter (TEK-678) and the monitor display).
	⚠	Flashing – There is a problem with the RF signal from the transmitter. (Appears both, on the transmitter (TEK-678) and the monitor display).
	❄	The temperature is close to or below the limit of operation of the transmitter sensor – the information may be affected.
3	**€ / £ / $**	The value displayed is cost-based.
	%	The value
	675	Numeric display – used to show numeric values and the time.
	KgCO$_2$	The value displayed is of Kg of CO$_2$ (carbon emissions).
	cms./ins.	The value displayed is in centimeters / inches.
	Ltrs./Gals.	The value displayed is in liters / gallons.
	(USB symbol)	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 day 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 useable 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 Definitions / Glossary

Ullage	The distance from the sensor transmitter to the surface of the liquid in the tank.
Outlet	The connection point from which oil is drawn from your tank to feed your boiler. It is typically located 8 cm/3 in above the bottom of your tank in one of the sidewalls. Oil below the outlet level is not useable. For Top Discharge tanks, the feed point is typically located at 8 cm/3 in 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 the regulatory requirements.
Useable 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 transmitting sensor and the 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 DTW calculation is based on your recent usage patterns.
RF	Radio Frequency – the tank level measurements are conveyed wirelessly to the monitor from the transmitter using RF transmissions.
$KgCO_2$	Kilograms of carbon dioxide.
SETUP mode	SETUP mode is used to configure the monitor for your oil tank.
LEARN mode	LEARN mode is used to match the transmitting sensor with the monitor.
NORMAL mode	NORMAL mode is for day-to-day use of your monitor – this mode 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 liters/gallons, as percentage and the DTE.
HISTORICAL information screens	Screens in NORMAL mode that display information about your historical usage of oil in liters/gallons, cost and environmental impact.

4 Technical Specifications

Tank Size
Minimum Depth: 0.5m/1.5ft
Maximum Depth: 3m/9.8ft
Displays
Multi-function LCD display including:

- 10 bar-graph level indication on both the monitor and transmitter (TEK-687 only)
- Display of various current and historical values (monitor only)
- Display control with five control buttons.
- Red LED for low-level indication at 5% or less of useable fuel remaining.

Audible Alarm
Audible alarm sounds every hour on the hour when the tank level is low.
Max communication distance
Typically 80m/250ft in normal 'line of sight' conditions
Wireless Communications
914.5 MHz FM transmission
Power Supply

- Sensor Transmitter – 3V LiMn cell, CR2450
- Eco-Oil Monitor:
  - Receiver: 5V DC (40mA)
  - Back-up battery: 3V LiMn cell, CR2450

Power Supply (included) for Eco-Oil Monitor
100-240 VAC, 50-60 Hz, meets UL/EN60950-1
Monitor use only – not for use with other device
Battery Life
Sensor Transmitter: 5 years (estimated life)
Eco-Oil Monitor: Receiver memory backup battery: 3 years if device is not plugged in*

Dimensions
Sensor Transmitter: 140mm x 70mm x 40mm
Monitor: 120mm x 90mm x 50mm

Max and Min Operation (Sensor Transmitter)
Operating temperature range:
-10°C to +60°C / +14°F to +140°F
Operating Humidity: 0 – 95% non-condensing

Hole size for fitting transmitter sensor:
32mm / 1.25 inch diameter

* 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.

5 Notes

- Please retain this product manual and the installation guide. It contains practical and important instructions, safety precaution warnings and technical specifications.
- When used according to recommendations the Eco-Oil Monitor will monitor the oil levels in your tank and calculates/presents figures relating to the remaining oil, historical usage and the related monetary and environmental costs. The Eco-Oil Monitor must not be used as verification of a 'Weight and Measures' certified dispensing meter.
- Patents pending or covered by the following patents: S2003/0882, EP2131164 (A1), US2006261966 (A1), US7277020(B2), IE20030882 (A2), S2008/0466, US2009/0303059 A1
- The monitor should be connected to a power source continuously. It contains a small battery to keep time during power cuts. If the monitor is left unpowered for an extended period then the battery will deplete and information may be lost. When your domestic oil heating system is not in use, you may unplug the monitor 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 switch your heating system on again, the Eco-Oil Monitor will continue monitoring your oil usage and calculate the financial cost and environmental impact.
- When the monitor 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 sensor transmitter cannot receive a reliable echo due to turbulence within the tank and may cause the 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 below120mm/5in from the sensor transmitter. The transmitter will be unable to send accurate readings during this period.
- Please note that the amount of oil in a first fill into a tank will differ from the amount shown on the display. This is due to the act that the monitor displays the volume of usable oil available. In its calculations the monitor makes an allowance of 8cm/3in 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 pressurized 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 can affect the tank capacity. Such changes may affect your readings.

6 General Product Safety, Care and use guidelines

- 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 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 extensive force, shock, dust, temperature or humidity.
- The LCD panel behind the display (applies to monitor and sensor transmitter with 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 such as radiators, stoves, heaters, etc.

- Do not use the monitor (display unit) in or near water or high-moisture areas i.e. bathroom.
- Do not tamper with the monitors 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 only 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 Eco-Oil display as this may cause damage.
- Do not replace batteries in a potentially explosive atmosphere.

7 Display screens

The Eco-Oil Monitor displays two types of information

1 CURRENT information screens – used in normal mode to show the current status of the oil level in your tank. Change between the 'Ltr./Gal.', '%', 'Days to Empty' and Clock screens using the ▲ and ▼ keys.
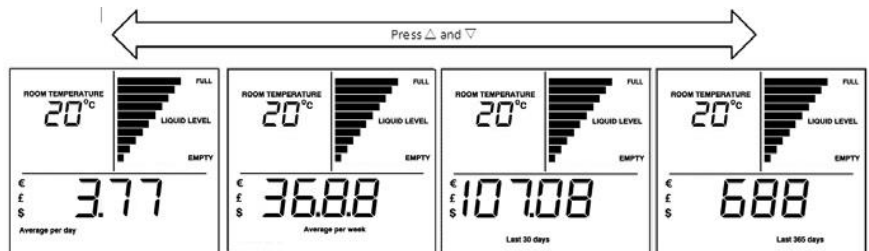

Press △ and ▽

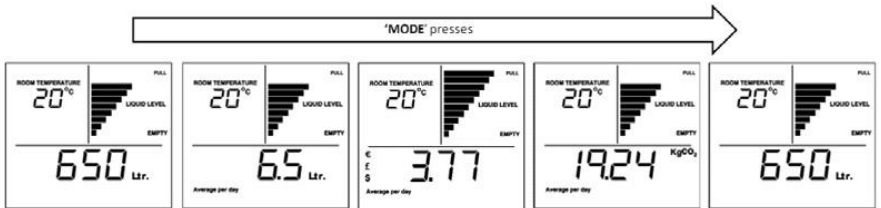650 Ltr.   70.6 %   100 Days to empty   15:46
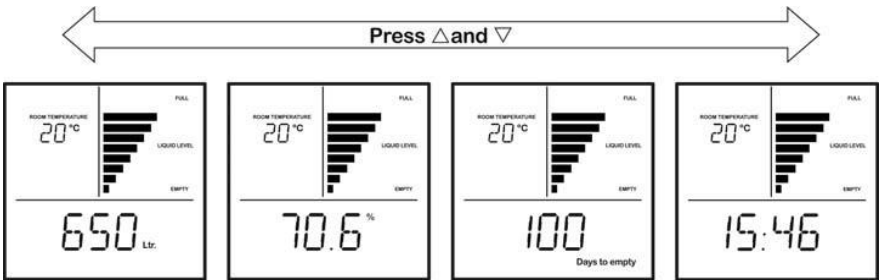
For approximately 1 week after the monitor is installed, it collects data so that the 'Average per Day' value may be calculated. During this period the screen will flash '---' when showing 'Days to Empty' – this is shown as a red circle in the diagram to the right.

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 HISTRICAL screens under these conditions.

The screen may also show '---', if the monitor had been unplugged for some time. In this case '---' means that it has not received a reading from the transmitter sensor to enable a value to be displayed. Depending on how long it has been unplugged the screen will revert to normal after a period of a few hours up to a maximum of 1 week.
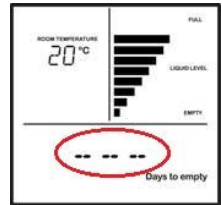
2 HISTORICAL information screens show 'Fuel usage – Liters/Gallons', 'Fuel usage – Cost' and 'Fuels Usage – Carbon'. Pressing MODE and ▲/▼ access these screens. NOTE: All diagrams show EU readings. In the USA the corresponding imperial data will be displayed on the monitor.

'MODE' presses

650 Ltr.   6.5 Ltr. Average per day   3.77 Average per day   19.24 KgCO2 Average per day   650 Ltr.

Press △ and ▽

3.77 Average per day   36.8.8 Average per week   107.08 Last 30 days   688 Last 365 days
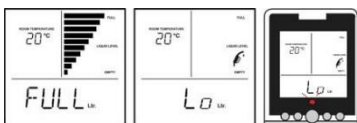
The monitor will automatically return to the CURRENT information screen after 30s with no key pressed within the HISTORICAL information screens. The maximum value displayed is 19999.

8 Tank Setup

To calculate the volume in your tank the monitor needs to know the shape of your tank. There are three basic shapes as illustrated in the Installation Guide. Identify the

	Tank Capacity (Ltrs./Gals.)			Tank Height (cms./ins.)			Tank Width(cms./ins.)		
	Low limit	Default	High limit	Low limit	Default	High limit	Low limit	Default	High limit
A	300	1000	10000	50	100	3	N/A	N/A	N/A
B	300	1000	10000	Tank Width	100	300	50	50	Tank Height
C	300	1000	10000	50	50	Tank Width	Tank Height	100	300

shape that is closest to the shape of your tank. Each monitor is supplied with the default settings. The monitor must then be configured to your own tanks dimensions (see installation guide). Minimum and maximum allowable values for tank dimensions are shown in this table.

9 Alarms / Indications.

Full Indication:
When the level in your tank is less than 12cm/5in from the top of the tank, i.e. bottom of the transmitter, the main display will show 'FULL'.

Low Level Indication:
When the tank level falls to within 14cm/5in of the bottom of the tank the 'bowser' symbol will flash.

When the volume of oil in the tank drops to below 10%, the CURRENT information screen alternates between showing the 'Ltr/Gal' (or % or DTE) and 'Lo'. If the oil level drops to below 5%:

- 'Lo' is displayed constantly on the CURRENT information screens.
- The buzzer sounds 5 times, repeating every 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.
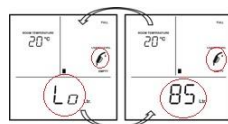
10 Sensor Transmitter Battery Change

If the transmitter battery needs to be changed the display will provide advance warning by showing the 'TANK LOW BATTERY' text below the graph.

- Remove the 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-synchronize the transmitter with the monitor when the sensor transmitter battery is changed.
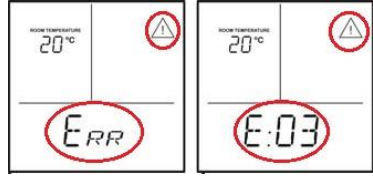
Disposal
The crossed out dustbin on the packaging indicates that this product and its battery shall not be treated as household waste. Proper disposal will help prevent potentially negative consequences for the environment and human health. For more detailed information about recycling of this product or battery, please contact your local Recycling center or the shop where you purchased the product.
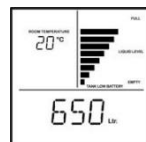
11 Troubleshooting

Full Indication:

If the monitor does not receive or cannot understand the RF signal when the level in your tank is less than 12cm/5in from the top of the tank, i.e. bottom of the transmitter, the main display will show 'FULL'.

Error	Description	To Rectify
E01	Received reading is inconsistent	- Check that the transmitter is vertical on the tank. - Check positioning of the transmitter (ensure that the transmitter is not too close to the tank sides or internal obstructions). - Ensure that the tank is not overfilled and that the bottom of the transmitter is clean.
E02	Reading not received after 6 hours	- Check that 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 using an FM signal and moving the monitor plug from possible metal obstruction can improve the signal. - Check that there is no metal object such as a van, truck to 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 that the transmitter is not too tightly attached to the tank. - Ensure that the monitor is not too close to or obstructed by other electrical appliances.
E03	Reading received but void	- Check positioning of the transmitter (ensure that 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/5in free space between the transmitter and oil level. - Ensure that the bottom of the sensor is clean. - If a bund tank, ensure that the transmitter is located on the inner tank.
E04	Received reading greater than tank height	- Check the tank height and ensure that this information is correct on the monitor, press the ^ and v key 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 using ^and v keys. Press ENTER to save. - Press SETUP to exist setup mode. Await 3 hours for updated readings.
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.

12 Statement of compliance

Warranty Registration

This product carries a 12-month warranty from the date of purchase against any deficiency or fault in manufacture. This does not affect your statutory right or any warranty offered by the seller. This warranty does not cover normal wear and tear, damage caused by negligence, accident, improper use or incorrect installation. Any change or modification made by the purchaser or user to the appliance will invalidate the guarantee, as would any attempted repair. The warranty applies only when the appliance has been operated in accordance with the instructions and connected to an electricity supply which matches that shown in the manual.

The warranty will be rendered invalid if the product is resold by the end user. The product must be used solely or domestic purposes. Timitoo Inc.'s obligations are limited to the repair, or at its sole discretion, replacement of the unit. The unit should only be returned upon receiving confirmation that the return will be accepted. Distributors should get in touch in this regard with their normal sales contact. Other parties should only return the product for warranty assessment via the point of original purchase. Timitoo Inc. and its distributors shall not be liable for indirect or consequential loss or damage resulting from the use of this product.

Please register your product for warranty at:
https://www.tankmonitoring.net/warranty-registration.html

Support

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