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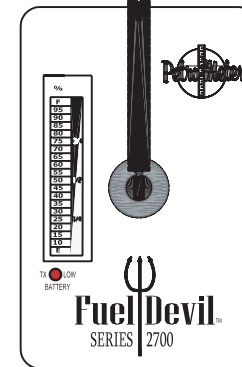
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## **PETRO-METER SERIES 2700**

# Fuel Devil™



### **WIRELESS TANK LEVEL SYSTEM**

**MADE IN U.S.A.**



# SERIES 2700 FUEL DEVIL™

## GENERAL DESCRIPTION

Thank you for your purchase of a Petro-Meter Series 2700 Fuel Devil™ system. This state-of-the-art, digital, wireless, remote tank monitoring system is the culmination of years of research and development efforts. The Fuel Devil™ is a microprocessor controlled system that relies on the dielectric properties of fuel oil to obtain accurate and reliable level readings. In short, it effectively measures the electrical capacitance value that is determined by the total height of fuel oil contained within a vessel.

As a matter of information, this technology has been used in commercial aircraft fueling systems for decades. Having taken a page out of aerospace engineering design, we have now made this technology available in a cost-effective package adequate for residential and commercial fuel tanks containing No.2 Fuel Oil\*.

\*Note: This system will not function properly with any other liquids including water.

The Fuel Devil™ is capable of producing remote tank level readings within 5% of the total vertical tank height measured. Unlike other wireless indicators within its class, the Fuel Devil™ bases all readings on the **actual height of oil** registered by its immersed capacitance probe, and **not as the resulting calculation after measuring the empty space above the fuel**, as other products do. In order to produce an accurate level reading, we measure the level of oil and nothing else.

## FUEL DEVIL™ LIMITED WARRANTY

Petro-Meter Corporation warrants all Fuel Devil™ systems to be free from manufacturing defects in materials and workmanship for a period of 180 days from the original date of purchase. Petro-Meter Corporation will, within said period, at its option, repair or replace any product failing to operate, and return such product, without charge, to the original purchaser or user, provided it is returned to Petro-Meter Corporation by the original user or purchaser, with all shipping costs prepaid and insured, in an appropriately protected shipping container if not the original protective packaging.

Petro-Meter will not assume any additional liability for products that sustain further damage caused by inappropriate packaging when shipping items back for factory repair or replacement. This warranty shall not apply to any equipment or any part thereof, which has been repaired by other than Petro-Meter Corporation, improperly installed, improperly used or adjusted, abused, altered, physically or electrically damaged, subjected to acts of God, or on which serial numbers have been altered, defaced or removed. The seller will not be responsible for any dismantling or reinstallation charges or fees. There are no warranties, express or implied, which extend beyond the description on the face hereof. There is no express or implied warranty of merchantability or a warrant of fitness for a particular purpose. This warranty is the sole warranty in its entirety. Any prior agreements or representations, whether oral or written, are either merged in this warranty or are expressly cancelled.

Petro-Meter Corporation neither assumes, nor authorizes any other person purporting to act on its behalf to modify, to change, or to assume for it, any other warranty or liability concerning its products. Additionally, this warranty is in lieu of all other obligations or liabilities on the part of Petro-Meter Corporation Seller's warranty, as hereinabove set forth, shall not be enlarged, diminished or affected by, and no obligation or liability shall arise or grow out of, seller's rendering of technical advice or service in connection with buyer's order of the goods furnished hereunder. Petro-Meter Corporation suggests that all installed Fuel Devil™ systems should be tested prior to installation and that no adjustments be made to any component of the system, except for those made by personnel qualified and or trained in such adjustments or modifications, and that no such adjustments or modifications be made without express written permission by Petro-Meter Corporation. Incorrect or inappropriate adjustments will cause the Fuel Devil™ system to fail or to operate improperly. Petro-Meter Corporation Limits its liability for any loss or damage, including incidental or consequential damages arising from the failure of its product to Fuel Devil™ original selling price of the product regardless of the cause of such loss or damage.

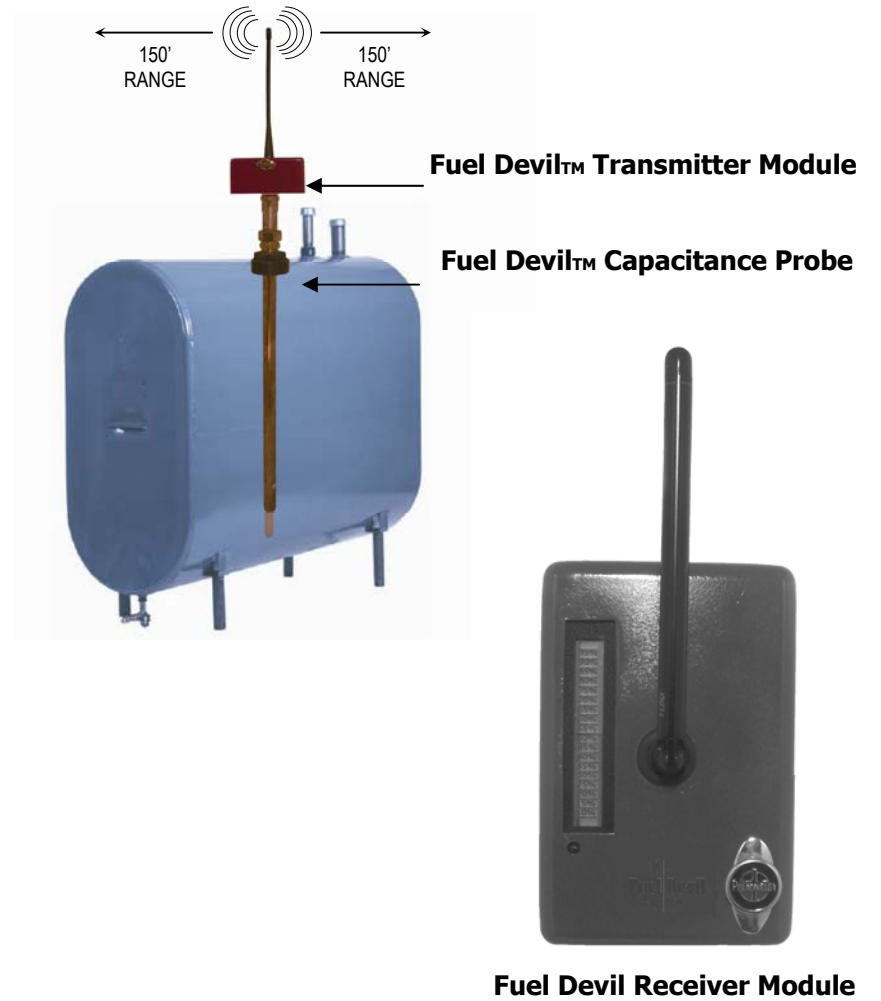
Since Petro-Meter Corporation hereby represents that it is not an insurer of either the property or safety of the user's family or employees, if the user wishes to protect itself to a greater extent, Petro-Meter Corporation will, at the user's sole cost and expense, obtain an insurance policy to protect the user, supplemental to the user's own insurance policy at a premium to be determined by Petro-Meter Corporation's insurer, upon written notice from the user, verified by certified mail, return receipt requested, to Petro-Meter Corporation's home address, and upon payment of the annual premium cost by the user. Any action for breach of any expressed or implied warranty must be brought within 6 months following the end of warranty period. In no case shall Petro-Meter Corporation be liable to anyone for any consequential or incidental damages for breach of this or any other warranty, express or implied, even if the loss or damage is caused by the seller's own negligence or fault.

Warning: Any electronic system is susceptible to unforeseeable random failure, and as such, it is possible for this system to fail to operate or perform as expected despite frequent testing. Malfunction can be due to electrical disturbances or disruptions, communications malfunctions or disruptions, criminal tampering, unauthorized adjustments, or other means beyond the seller's control. Petro-Meter Corporation does not represent that the system/product may not be compromised or circumvented; or that the product or system will prevent any personal injury or property loss. A properly installed and maintained system may only reduce the risk of flood damage, or otherwise but it is not insurance or guaranty that these events will never occur. Consequently, the seller shall have no liability for any personal injury, property damage, or other loss based on a claim that the product has failed. To mitigate any such loss occurrence, system confidence testing on a regular basis, is absolutely crucial. The consumer is hereby advised to take any and all precautions for his or her safety and the protection of the premises in order to mitigate the possibilities of harm and/or damage should the Fuel Devil™ system experience a random electronic failure beyond anyone's control or prediction. This warranty shall be construed according to the laws of the state of New York. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, or differentiate in their treatment of limitations of liability for ordinary or gross negligence, so the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights that vary from state to state.

**SYSTEM NOTES:**

As a result, a tank level indication of 50% from your Fuel Devil™ will literally convey that your tank is half full; a philosophy that we here at Petro-Meter embrace with everything we do.

**SERIES 2700 FUEL DEVIL – SYSTEM SCHEMATIC**



## THE SYSTEM CONSISTS OF THE FOLLOWING:

**Fuel Devil™ Transmitter:** This module operates on four “AA” batteries (not included), and will broadcast an updated reading every 45 minutes, to distances of up to 150’. A 4-pin selection switch allows for the user to select 1 out of 16 distinct broadcast channels (**Fig.1**) in order to avoid frequency conflicts with other existing wireless devices (garage door openers, Leak-Guardian® Sensors, other local Fuel Devil™ transmitters, etc). This signal can be picked up by any number of Fuel Devil™ receiver modules keyed into the same frequency code thus offering remote tank level readings to any number of additional locations. The Fuel Devil™ transmitter is designed to also broadcast a low battery warning signal that will illuminate a corresponding indicator LED (**see Fuel Devil™ Receiver**) on any receiver/s paired up with it. This warning signal is produced when the transmitter battery voltage drops to 4V. Although this module may continue to broadcast accurate tank readings for some time after this warning signal is produced, it is recommended that batteries be changed at once in order to ensure uninterrupted level updates.

**Safety Note:** Although the potential for electrical arcing on this low voltage system is extremely remote, the Fuel Devil™ transmitter module has been designed with safety as the highest of priorities. This module can be easily detached from the probe platform base mount, disconnected from the 5-PIN probe connector (**Fig.1**), and removed from any hazardous area (Class I, II and/or III atmospheres) for the ultimate in safe battery replacement procedures.

Your Fuel Devil™ system is now ready to broadcast tank readings to your remote receiver unit on a scheduled basis. Any amount of additional receivers units can be added to your system to relay remote level readings at distances of up to 150’. Please make sure that any additional receivers added to your system are keyed into the same frequency code as your transmitter for this purpose.

Please do not hesitate in contacting Petro-Meter Corporation with any questions or concerns regarding this system.

Thank you for placing your trust in this Petro-Meter product. We look forward to your complete satisfaction.

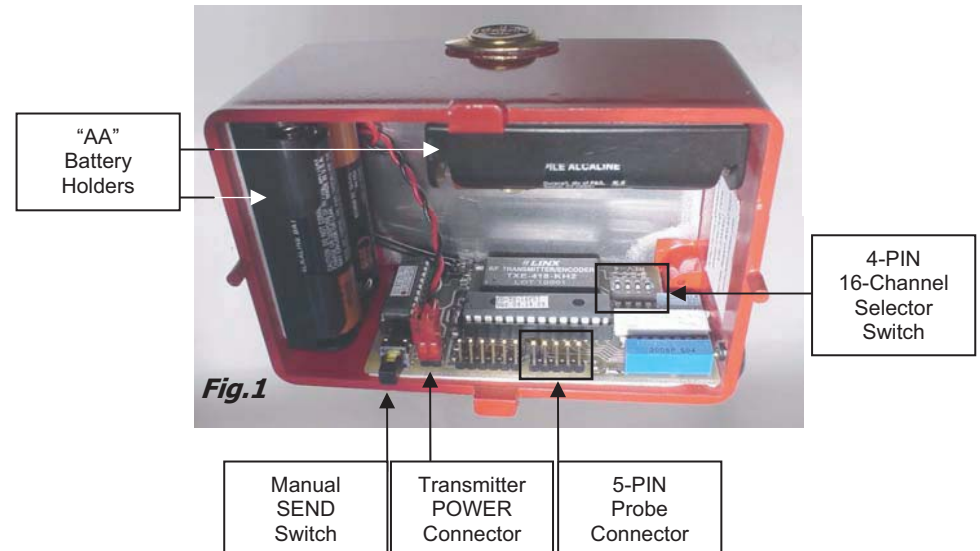
**PETRO-METER CORPORATION**

- 11) Verify that the transmitter is working, and on the same frequency as the receiver by forcing a manual "SEND". This is accomplished by depressing the manual "SEND" pushbutton switch and holding it down until the receiver indicates a disconnected probe alarm warning (single beep and cascading lights as covered earlier in this guide). You are now ready to connect the transmitter to your installed probe and produce your first Fuel Devil™ tank readings. You might want to bring the receiver unit back to the tank location to verify this first reading.
- 12) Connect the probe's ribbon connector to the transmitter's 5-pin bank (**Fig.4**) conserving the probe connector's default orientation (do not twist or invert the connector in an effort to secure to the transmitter's 5-pin bank upside-down). Note: A proper connection can be secured using either of the two 5-pin female rows available on the probe's connector.
- 13) Depress the "manual send" button at the base of the transmitter to force the first system update to any receiver nearby. Confirm the receiver's reading and compare it the stick reading obtained prior to probe installation.
- 14) Gently fold the excess ribbon cable into the transmitter's housing and squeeze the sides of the transmitter to facilitate a secure mounting to the platform mounting base. A pair of guide pins help to align the transmitter into place, while a pair of molded "L" legs secure the unit through the oval slots provided on the platform base mounting plate.

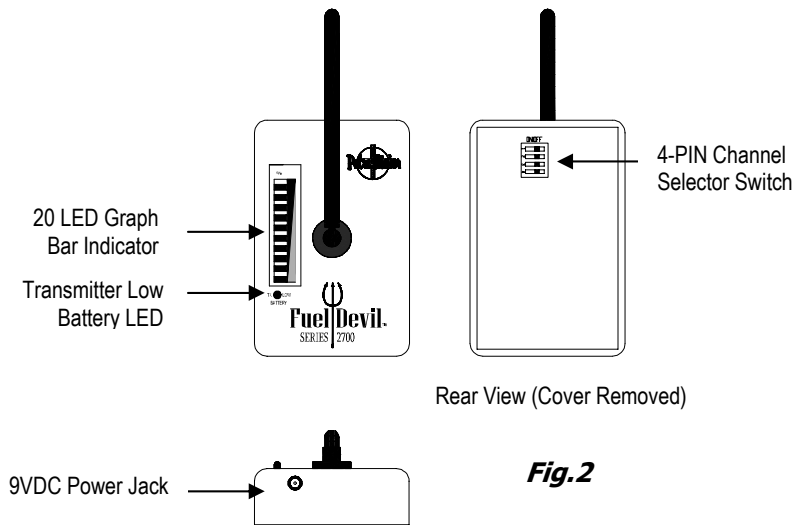
After battery replacement, updates will automatically resume at the regularly set intervals. To expedite an update, a manually initiated transmission can be forced at any time simply by depressing the manual "SEND" pushbutton switch (**Fig.1**) located directly under the transmitter module.

While operating, the Fuel Devil's CMOS analog-to-digital converter connected to the capacitive probe consumes only 1/1000 of a Watt of power. The actual current flowing through the capacitive probe is about 2 Microamperes, or 2 One-Millionths of an Ampere for approximately 10 Microwatts of total power.

For perspective, if you were to make a cell phone call in the vicinity of your fuel tank you would effectively expose the tank contents to a power field of possibly 100 Milliwatts, or roughly 10,000 times greater than the energy levels generated by Fuel-Devil.



**Fuel Devil™ Receiver:** This module (**Fig.2**) is powered by a UL listed, Class 2, Plug-In 9 VDC Adapter (included). It resolves all Fuel Devil™ transmitter data broadcasts to the 20 LED graph bar indicator that displays the remote fuel tank level in the form of 5% increments.



**Fig.2**

Upon powering up, the bottommost LED (**E** for **EMPTY**) will turn on and remain illuminated. Aside from the automatic level readings detected by the Fuel Devil™ transmitter it pairs up with, it features three different alarm modes (**Fig.3**) as follows:

**Disconnected Probe Mode:** Should the Fuel Devil™ probe not have a secure connection with the adjoining transmitter, the signal sent to the receiver will be one of **cascading lights**. The adjoining LED's will flash intermittently as an indication that the probe is not properly connected to the Fuel Devil™ transmitter.

- 3) Insert the probe into the 2" tank opening and securely tighten the probe's 2" NPT bushing with a pipe wrench.
- 4) Slide the probe down through the brass compression fitting that is threaded into the 2" NPT bushing. Push until contact is felt with the tank bottom via the 6" plastic spacer.
- 5) Tighten the 5/8" compression nut securely with a wrench. This will effectively lock the probe into place.
- 6) Screw the locknut provided on to the male threads on top of probe. Keep the legs that define the outer diameter facing up in order to better grip the platform base mount.
- 7) Thread the probe's 10-conductor ribbon wire connector through the platform base mounting plate's center hole while noting the label indicating proper mounting plate orientation. Thread the mounting plate on to male threads on top of probe until it is completely flush with locknut previously installed.
- 8) For the utmost in precautionary measures, the following procedure should be done at a safe distance from the tank as covered earlier in this guide: Install four "AA" batteries into the transmitter's battery holders.
- 9) Connect the transmitter's 2-pin power jumper connector to the transmitter 2-pin bank (**Fig.4**) conserving the connector's default orientation (do not twist or invert the connector in an effort to secure to the transmitter's 2-pin bank in an upside-down fashion).
- 10) Connect the receiver to the power adapter supplied, and plug into a nearby wall outlet.

## SYSTEM INSTALLATION

The Series 2700 Fuel Devil™ is very easy to install, and can usually be accomplished in 10-15 minutes. Although few tools are needed to complete your installation, a large pipe wrench will come in handy to remove any existing 2" NPT tank plugs, as well as to tighten down the 2" NPT black iron bushing supplied with our probe. Also, a 5/8" fixed or adjustable wrench will be needed for locking down the probe once installed. Lastly, a means for obtaining an updated tank "stick" reading would be useful for confirming your Fuel Devil's accuracy once a reading is obtained. Install per these steps:

- 1) Please verify that there is enough over head space above your tank to ensure that the probe will have enough clearance for its installation. Keep in mind that the entire assembly must be lifted above the tank for it to be subsequently introduced. Note: Multiple-leg tank probes are available for installations with restricted over head spaces. Once adequate probe over head room is verified, proceed to remove the 2" NPT plug of any available tank opening in preparation of probe installation with a pipe wrench. With access to a tank opening, please consider obtaining a tank "stick" reading at this time in order to compare your actual tank oil level to your Fuel Devil's first broadcasted reading.
- 2) Slide the 6" plastic spacer into the bottom of the probe until the spacer shoulder makes contact with the bottom of the probe. This spacer will later serve to ensure that the probe is properly installed and maintaining a precise 6" gap from the tank bottom.

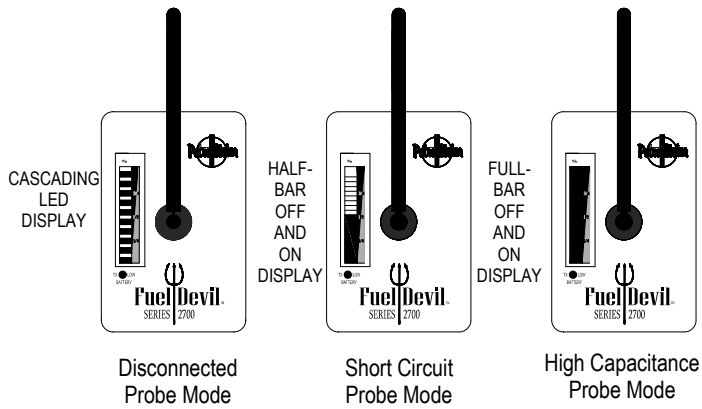
Example: A user removes the Fuel Devil™ transmitter from the probe platform base mount in order to replace all four "AA" batteries at a safe distance from the tank. Upon reinstalling the transmitter to the probe platform base mount, the connection made is not secured properly or otherwise compromised leaving an open circuit.

**Short Circuit Probe Mode:** Should a short circuit develop within the Fuel Devil™ probe, or at the point of connection to the transmitter (i.e. pinched wire, damaged wire insulation, etc.), the signal sent to the receiver will be one of **half-bar flashing lights**. The bottom ten LED's will flash alternately to the top ten LED's.

**High Capacitance Probe Mode:** Should an extraordinarily high level of capacitance be measured by the Fuel Devil™ probe (i.e. extreme overfill situation, high water absorption level within the fuel oil), the signal sent to the receiver will be one of a **full-bar flashing lights**; the full 20 LED graph bar will flash on and off with exception to the bottommost "E" light which always remains on when the unit is powered.

**Note:** This system has been designed to produce reasonably accurate, remote tank level readings. It should NEVER be used as an overfill prevention device or as a means for preventing a potentially dangerous high tank level condition.

All of these alarm conditions will produce an audible signal (single beep) every time that an updated signal is broadcasted by the Fuel Devil™ transmitter at the regularly set intervals.



**Fig.3**

**Level Fuel Mode:** As mentioned before, the Fuel Devil™ system is designed to warn the user of a potentially low fuel level condition by transmitting a low level fuel signal when tank level contents reach 30% of the tank's vertical capacity, or lower. The signal sent to the receiver will cause it to beep once with every update, and flash the remaining level indicating LED's, with exception to the bottommost "E" light which always remains on when powered. Once in low level mode, all subsequent level readings will continue to flash until a fuel delivery is received that will bring the level back up to 50% of vertical tank height. With a half-full tank, the Fuel Devil™ low level blink mode will reset automatically and related audible warning signals will discontinue.

**Fuel Devil™ Probe:** The basic sensing element for this system consists of (2) concentric copper pipes. A plastic spacer keeps this probe at a set 6" distance from the bottom of the tank to insure

proper operation in cases where sludge accumulation is a potential. This device uses no moving parts and aside from Fuel Devil™ transmitter battery replacement procedures, is virtually maintenance-free. This probe installs easily through a standard 2" NPT tank opening.

