Sales Office
20675 N. Friends Road
P. O. Box 309
Greenleaf, ID 83626
USA

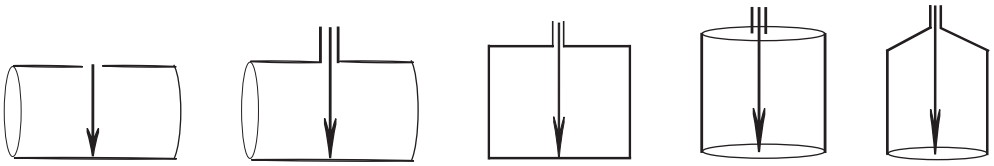
www.SOLAR GAUGE™.com by GREENLEAF GAUGE
A Division of I.T.M. Electronics, Inc.

888-884-2843
888-884-4145 - Fax
Outside USA
208-453-1714
208-459-3365 - Fax

EFG-8000 User's Guide

You ***MUST:***

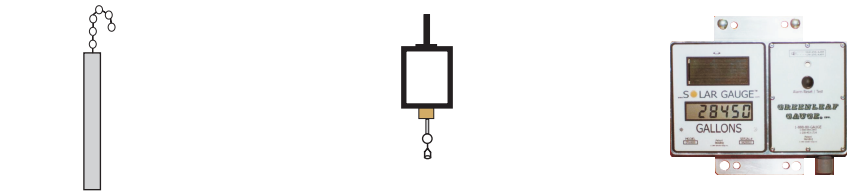
- accurately measure the tank from the top of the 2" pipe nipple to the bottom of the tank. Refer to drawings below.
- verify the ***actual*** tank capacity. Using the incorrect tank capacity will produce incorrect results. Refer to formulas on page 7 to compute tank capacities.
- ensure that the 2" NPT pipe nipple is vertically straight using a level. Adjust if needed.



Measurement points

DO NOT PROCEED WITHOUT UNDERSTANDING THE FOLLOWING:

1. The unit has been put into a ***"SLEEP MODE"*** for storage and shipping to preserve power. Sleep mode will display the Program Version Only. Touch the PLANET symbol on the front of the gauge with the red pocket magnet calibration tool to take out of the sleep mode and prepare for normal operation. Hold the magnet on the PLANET symbol only long enough for the display to change. The gauge will display ≡ - - - - then go to normal operating mode. Programming mode is entered by holding magnet on planet long enough for - - - - to appear.
2. The probe, transducer, and gauge are a matched set. If for any reason they are separated or used in an application other than that which they were intended, re-programming will be required.



PROBE TRANSDUCER GAUGE

This order #_____Type of liquid_____Tank capacity_____

The probe for this tank was ordered and custom designed for use in a tank that measures _____ inches from the top of the 2" pipe nipple to the bottom of the primary tank. If the actual distance differs from this amount, you will need to compensate by changing the length of the bead chain used to connect the probe to the transducer. Extra chain and a splicing link have been provided if you need to add chain. The chain can be shortened by cutting it to the desired length, or an additional riser can be installed.

THE PROBE MUST NEVER TOUCH THE BOTTOM OF THE TANK DURING NORMAL OPERATION or EXTEND ABOVE THE PRIMARY TANK HEIGHT. SEE ORDER INFORMATION SHEET FOR PLACEMENT. REFER TO PAGE 7 FOR TROUBLESHOOTING AND TECHNICAL ASSISTANCE.

www.SOLAR GAUGE™.com by GREENLEAF GAUGE

A Division of I.T.M. Electronics

EFG-8000

USER'S GUIDE

THIS INFORMATION PACKET INCLUDES THE FOLLOWING INFORMATION.

GAUGE CALIBRATION INSTRUCTIONS: The SOLAR GAUGE™ is a unique product. The calibration is much like programming a digital watch. Please follow these instructions closely. You will be asked to determine and confirm the shape of the tank and the actual tank capacity. Your gauge has been calibrated at the manufacturer. Programming the gauge is easily accomplished in the field. An "off set" option is available which can either add to, or subtract from the liquid value of the tank, depending on your specific calibration needs. (Refer to calibration instructions)

WARRANTY: A detailed copy of the terms and conditions of product application and warranty.

REPAIR AND RETURN POLICY: We service what we sell. Products under warranty may be sent back to Greenleaf Gauge for replacement or repair. Products past the warranty period may be returned to Greenleaf Gauge for repair or a core refund toward the purchase of a new gauge.

GENERAL PRODUCT INFORMATION

OPERATION:

The probe that is used with this gauge has been custom designed according to your specifications. These include: 1. Type of liquid to be measured. 2. Height of tank. 3. Capacity of tank 4. An accurate measurement from the top of the pipe nipple that the transducer is to be installed on, to the bottom of the tank. Use of this probe on a tank other than the one it was custom designed for, or in a product other than the one it was designed for, may provide inaccurate results. When properly installed, the probe must never contact the bottom of the tank, rest against the side of the drop tube (if used), or be allowed to touch any internal structures.

POWER:

The EFG-8000 can be powered by either a solar cell, or two (2) non-rechargeable 9 volt batteries. The solar cell model is intended for outdoor use. If you have an indoor location where you wish to use the gauge, or an outdoor location with inadequate light, please contact your distributor or Greenleaf Gauge today about our model which operates by the power of two (2) non-rechargeable 9 volt batteries

MEASUREMENTS:

The EFG-8000 will display up to five digits to show measurable units in gallons, liters, pounds, inches or % full. The same five digit display is used during setup, calibration, and to display operation or error messages.

INSTALLATION:

The EFG-8000 must be installed in accordance with your local regulations and manufacturer's specifications. Failure to do so may affect the long term service of the gauge and may void the warranty. Any regulatory issues should be directed to your local entity having jurisdiction over the issues involved. ***Manufacturer's specifications require any wire connections to the transducer, gauge, and their connectors, to be protected from the elements and other possible physical damages, by the use of appropriate electrical items such as conduit and junction boxes. The manufacturer will not be responsible for problems arising from improper equipment installation which may also void the warranty. Please refer to assembly instructions, page 3.***

IMPORTANT NOTICE: When this gauge and alarm are utilized as the High-level warning, the test/reset button should ALWAYS be tested by the operator before tank filling. If it does not respond correctly DO NOT FILL. The operator must monitor the tank filling process and the status of the gauge and alarm to prevent overfills.

HELP: For technical help please contact us between 9-5 M-F MST : Local 208-453-1714, or toll free 888-88-GAUGE (888-884-2843). Our fax numbers are 208 459-3365, or 888-884-4145, or visit us online at www.solargauge.com.

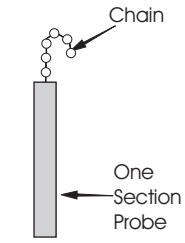


Figure 1

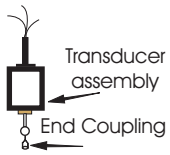
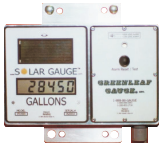


Figure 2



EFG-8000

Figure 3

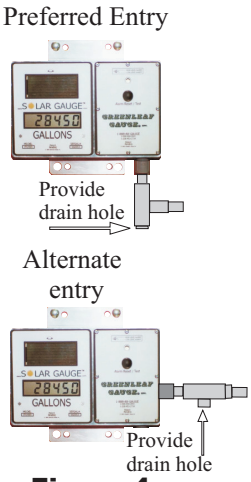


Figure 4

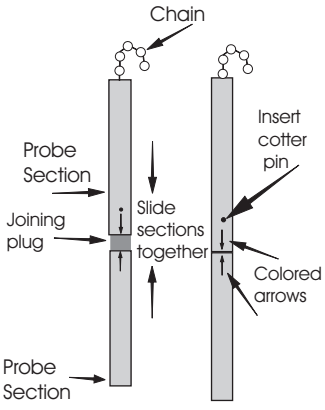


Figure 5

ASSEMBLY / INSTALLATION INSTRUCTIONS

Please remember that even though the probe is well made, the material is very thin walled and needs to be handled with care at all times.

NOTICE TO TANK MANUFACTURERS AND DISTRIBUTORS!
We recommend the gauge and probe be installed at the final destination. If it is necessary to install the gauge and probe before shipping to the final destination, the probe may be allowed to swing freely in the tank but precautions must be taken to eliminate it from "hanging up" on any internal tank structures. The probe must not be allowed to rub on anything in the tank during normal operation or it will severely reduce the accuracy of the gauge.

TO ASSEMBLE "ONE SECTION" PROBE

1. Remove the probe, gauge, and transducer from the shipping boxes. Take care to remove all packing materials (bubble wrap, tape, etc.) from the units. You may use a clamp near the top of the probe during installation. This clamp will keep the probe from falling into the tank during assembly.

2. Insert the probe **(**See **Figure 1)**down into the 2" pipe nipple. Apply a good quality pipe thread sealant to the 2" pipe threads. Connect the probe to the transducer assembly. **For multi-section probes see instructions below.**

3. To connect the probe to the transducer, simply snap the free end of the chain on the top of the probe into the end coupling connected to the split ring located at the bottom of the transducer. (See **Figure 2**) Screw the transducer assembly onto the tank's 2**"** pipe nipple. **When the tank is empty the probe should never touch the bottom of the tank. Adjust the bead chain so that the bottom of the probe is the distance from the tank bottom as specified on the order information sheet.**

4. Mount the gauge (See **Figure 3**) to the tank at the location of your choice. Connect the transducer assembly to the gauge by use of the wire and wire nuts provided. CONNECT LIKE COLORED WIRES TOGETHER. Remove right cover plate from gauge console. Carefully unplug the alarm wire from the connector board inside. Set cover and screws aside while wiring the console. Attach necessary conduit fittings to the gauge to weather proof the console before inserting wire from the transducer through the conduit into the gauge console. Connect wires to wire terminal according to wiring label inside the gauge console. Plug alarm wire back into the connector board. Carefully position the cover plate back onto the gauge console to ensure weather proof seal and replace ***ALL*** screws. To comply with manufacturer's specifications, wire and wire connectors must be installed using appropriate junction boxes and conduit to protect it from the weather or other damages.

NOTE: Water destroys live electronics. Precautions must be taken to eliminate water from getting into the gauge console. Manufacturer's recommendation is to install a conduit junction with a drain at a lower elevation than the gauge and / or conduit seal at the gauge to eliminate moisture from entering the console. We recommend using a sealant to plug the hole that the wires pass through to enter the gauge. (See **Figure4**) Failure to do so may void the warranty.

This gauge has been calibrated at the manufacturer to your specifications. Please refer to the gauge and probe packing slips for details. If your gauge or the probe specifications do not match your tank dimensions and requirements, you will need to purchase a different probe. If you need to calibrate the gauge, this can be easily accomplished by following the instructions page titled CALIBRATION.

TO ASSEMBLE "MULTI-SECTION" PROBES

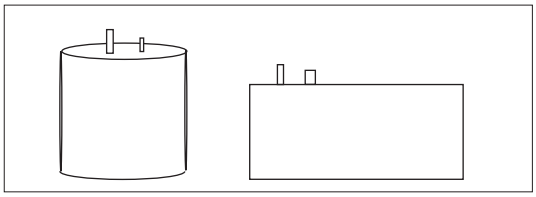
Remove the probe sections from the shipping container and the packing materials. Please use only the cotter pins provided to connect the sections of the multi-section probe, as all components are carefully weighed. (See **Figure 5**) Lower the probe into the tank beginning with the bottom section. Carefully slide the sections together over the joining plug and align the matching colored arrows then insert cotter pins. Repeat procedure until all sections are connected and lowered into the tank. Connect the fully assembled probe to the transducer. Continue installation with steps 3 and 4 in "TO ASSEMBLE ONE SECTION PROBE" instructions.

HELP: For more detailed technical support please call us between 9-5 M-F MST : Local 208-453-1714, or call our toll free number at **888-884-2843**, or visit our web site online at **www.solargauge.com.**

PROGRAMMING INFORMATION

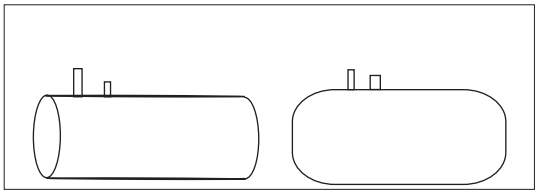
Included with the SOLAR GAUGE™ is a 6" pocket magnet. This is the tool used in the calibration of the gauge. On the face of the gauge, you will find three symbols which are also important to the calibration process. These three symbols are:

PLEASE READ *ALL* INSTRUCTIONS *BEFORE* PROGRAMMING THE GAUGE.
Prior to calibration, determine what shape of tank the gauge will be used on. See diagrams below:



STRAIGHT TANKS

OR



ROUND TANKS, & CUSTOM SHAPES

SYMBOLS USED DURING PROGRAMMING:
Displayed during setup and programming.

- `---` Tank select mode
- `-00-` Round tank program or
- `-11-` Straight tank program
- `-PP-` Program tank capacity
- `-LP-` Low calibration point
- `-HP-` High calibration point
- `-AL-` Alarm - low level
- `-AH-` Alarm - high level
- `-OS-` Off set value (optional)
- `End` Programming complete

SYMBOLS USED DURING OPERATING MODE:

`HELP` Gauge will alternate the `HELP` error message code with one of the following error codes to help identify the problem area to correct. DO NOT FILL TANK until problem has been corrected and the gauge is operating properly.

- `-***` Negative number- the gauge has gone below the determined zero level.
- `EEEE` Measurement has exceeded the set capacity of the tank, or probe is resting on bottom of the tank.
- `0--0` Connection failure between the transducer and gauge.
- `-EE-` Reading has gone below extended range.
- `ISLA` Interstitial leak alarm (optional model)
- `LOBA` Low battery. Contact distributor for replacement.

(*) *Represents any numerical value, 0 through 9*

BATTERY

The EFG-8000 is equipped with a replaceable backup battery. Should the error code, `LOBA`, appear for low battery, contact your distributor or Greenleaf Gauge for an authorized battery replacement. Use of an improper battery may damage the gauge, or effect the operation of the gauge and alarm.

HIGH / LOW ALARM

The EFG-8000 model with Alarm features a **High Level Alarm** which can be set from 95% to the Low level Alarm % of tank capacity (as per instructions in calibration section of this user's guide). The High Level Alarm can not be disabled. The alarm will enunciate every 0:03 sec for 0:90 sec, after which it will enunciate every 0:06 sec until the operator presses and holds the reset button for 0:30 sec. To conserve the power supply, we highly recommend that the operator turn off the alarm as soon as it sounds a high level warning. The **Low Level Alarm** can be set at any % of tank capacity up to the high level setting and will enunciate with a less frequent (every 0:20 or 0:90 sec) series of three "chirps" until liquid is added to the tank. To disarm the low level warning alarm the operator can set the values to `00` (as per calibration instructions).
WARNING: **The individual filling the tank should always test the alarm prior to filling the tank. Press and hold the "Test / Reset" button until three short beeps are heard, indicating that the gauge and the alarm are working properly. This does not, however, insure that the tank and alarm settings were properly entered. This has to be verified in the programming mode above at the time of installation.**

CALIBRATION INFORMATION

Typically, all gauges come with all the calibrations already entered. These next two pages are for your information on how to program the gauge if adjustments are needed.

DO NOT ADJUST THE -HP- VALUE UNLESS YOU HAVE CONTACTED GREENLEAF GAUGE AND CONFIRMED THE NEW VALUE ENTERED

Before proceeding with calibration instructions, please read and understand the following information.

As noted all gauges should have been calibrated by the manufacturer to your tank specifications. Refer to gauge order information provided with the gauge. In all other cases you must physically measure or have the tank manufactures dimensions of the tank. From this information we can confirm the total capacity of the tank and the volume per inch of the liquid inside. With this information we can compare to the gauge read out. If the difference is greater than 2% of the total capacity, it maybe necessary to re-calibrate, follow these instructions carefully. As mentioned**,** the transducer is matched to the gauge, in the event that a different transducer is connected to the gauge, the new transducer HC and LC numbers MUST BE CHANGED. If this is not done**,** the gauge may seem to operate but will NOT TRACK the actual volume correctly. **NOTE:** If you feel you need any assistance in changing the calibration values, please feel free to call Greenleaf Gauge at 888-884-2843 between 9:00-5:00 M-F MST. After confirming all the tank and transducer values, if the error is less than 3%, you could adjust the -OS- value to reduce the difference.

TANK SHAPE: -11- Setting is for most vertical wall tanks, -00- setting for all other tank shapes, some shapes require custom programs that must be entered by the manufacturer and are not options available to be changed out in the field.
TANK CAPACITY: One of the most important required calibration points for this gauge is the ***actual*** capacity of the tank. If the value is not accurate (***the exact tank capacity***) the gauge will automatically begin with a "built in" percentage of ***error***. If there is a manufacturer's tank chart available that is used with a stick, that is the capacity that should be used on the gauge setting for - PP - in the calibration process. ***Any deviation from this will result in an inaccurate measurement of the liquid level in the tank.*** Refer to the mathematic formulas in the trouble shooting section to compute the exact capacity of the tank.
The **LOW POINT** calibration value (- LP -) represents the number of gallons (or other measurable units) between the bottom of the hanging probe and the bottom of the tank. Even if the tank is completely empty the gauge should display this value. This value is equal to perhaps 2" to 5" of liquid depending on tank height. LOW POINT calibration adjustments are able to compensate for some minor inaccuracies in probe positioning and gauge readings.
The **HIGH POINT** calibration value (- HP -) is obtained from the published literature that was attached to the gauge when shipped. This value is **approximately** 75% of the tank capacity. Provided the density of the liquid in the tank is the same as the gauge was ordered for, *normally* the HIGH POINT calibration value should never need to be changed. The reason for this is that the high point is directly relational to the weight of the liquid being measured and not the level of the liquid. Changing this value without knowing what you are doing will make the gauge error in all the levels of the tank. Please contact Greenleaf Gauge for help at 888-884-2843 between 9:00-5:00 M-F MST . An example of when a gauge operating on a tank that has the liquid monitored is changed, i.e. gas to diesel (and that was the only change), this -HP- value would have to be changed. In some cases, the probe and/or the transducer would also need to be changed.

REMEMBER: The accuracy of this gauge depends on**:** the accuracy of the ordering information provided, accuracy of probe installation, and the accuracy of the information programmed into the gauge.
NOTE: During the calibration process, the gauge will automatically go to "normal" operating mode if too much time lapses between calibrating steps. If this occurs, go back into the calibration by starting at the top of the menu. Unnecessary steps can be passed through at any time simply by touching the PLANET symbol again and not changing the displayed values with the star or moon symbols.

CALIBRATION STEPS

NOTE: ***≡ WILL BE DISPLAYED ON LEFT DIGIT OF DISPLAY DURING ENTIRE CALIBRATION PROCESS.***

STEP 1: **TANK SHAPE:** Hold the end of the magnet on the PLANET symbol until the gauge displays ≡---- . This indicates the beginning of the programming cycle. After removing the magnet, the display will read -11- for "straight" tanks, or -00- for "round" tanks. To switch the type of tank, hold the magnet to either the STAR for "straight"style tanks (-11- will be displayed to signify a straight tank), or the MOON for "round"style tanks (-00- will be displayed to signify a round tank).

STEP 2: **TANK CAPACITY:** Hold the magnet to the PLANET and -PP- will appear. Remove the magnet and adjust the number shown to match the actual tank capacity. The correct tank capacity is critical to the accuracy of the gauge. Formulas for computing the tank capacity may be found in the troubleshooting section. To increase the numerical display, touch the magnet to the MOON, to decrease the numerical display, touch the magnet to the STAR. If you go past the desired value on the display, simply reverse the direction by using the other symbol. Continue in this manner until the desired value is displayed on the gauge.

STEP 3: **LOW CALIBRATION LEVEL:** Hold the magnet to the PLANET symbol and -LP- will appear. With vertical tanks this is a 1:1 adjustment. This value should represent the volume of fuel between the bottom of the tank and the bottom of the transducer. **EXAMPLE:** In vertical wall tanks this is calculated by the quantity of gallons per inch or some value of quantity per rise in height. Then do the math to calculate your quantity for your dimension. Horizontal cylindrical tanks are adjusted in the same manner, however the change is NOT a 1:1 ratio, get a tank chart made for the tank to make the correct input value. DO NOT JUST SET THE LOW POINT TO THE CURRENT TANK VOLUME. To adjust the LOW POINT, touch the magnet to the STAR or MOON symbols to enter the desired low calibration value. Use the STAR symbol to decrease the value, or the MOON symbol to increase the value. If your desired adjustment cannot be accomplished by changing the LOW POINT, call Greenleaf Gauge for technical assistance.

STEP 4: **HIGH CALIBRATION LEVEL:** Hold the magnet to the PLANET symbol and -HP- will appear. The high level calibration value sets the gauge for proper liquid densities. i.e. Different types of fuels. This value has been published on the gauge order form attached to the gauge when shipped. Once this value is set, there is no need to change it unless the density of the liquid in the tank is different than that for which the gauge was originally ordered. If it becomes necessary to change the high level, contact Greenleaf Gauge for technical assistance. **WARNING: If this value in changed incorrectly, the gauge will appear to operate, but will not track the volume correctly and an overfill event may result. Call for assistance.**

STEP 5: **LOW LEVEL ALARM SETTING:** Hold the magnet to the PLANET symbol and -AL- will appear. Remove the magnet and adjust the low level alarm value. Alarm values are displayed in % of tank capacity. To increase the %, hold the magnet to the MOON symbol, to decrease the %, hold the magnet to the STAR symbol. The low level can be set from 1% to 95%, we recommend a setting between 10-20%. The Low Level setting will not exceed the High Level setting. Turn off the low level alarm option by setting the value to 00.

STEP 6: **HIGH LEVEL ALARM SETTING:** Hold the magnet to the PLANET and -AH- will appear. Remove the magnet and adjust the high level alarm value. Alarm values are displayed in % of tank capacity. To increase the %, touch the magnet to the MOON symbol, to decrease the %, hold the magnet to the STAR symbol. The high level alarm can be set from 01% to 95 % of tank capacity but cannot be set at or lower than the low level alarm setting. Our recommendation is 90% or less.

STEP 7: is optional. Determine whether or not you want to use the OFF SET adjustment feature. This value can be entered as a **positive amount** which will add to the displayed amount, ***OR*** can be entered as a **negative amount** which will subtract from the displayed amount. Leaving the value of the off set at 00 will eliminate this option during normal operation. If you decide at a later date to activate this feature, simply go back through the menu and enter the off set value you wish. Touch the magnet to the PLANET symbol again and -05- will appear. To enter a negative off set value hold the magnet to the STAR symbol and a negative number will be shown. This value will automatically be **subtracted from** the displayed amount. To enter a positive off set value hold the magnet to the MOON symbol and a positive number will be shown. This value will automatically be **added to** the displayed amount.

STEP 8: Hold the magnet on the PLANET symbol until the gauge displays END- At this point the calibration process has been completed.

HELP: For technical help please contact us between 9-5 M-F MST : Local 208-453-1714, or toll free 888-88-GAUGE (888-884-2843). Our fax numbers are 208 459-3365, or 888-884-4145, or visit us online at www.solargauge.com.

TROUBLESHOOTING

Possible error messages that may be displayed on EFG-8000 model Solar Gauge.

HELP	Gauge will alternate the *HELP* error message code with one of the following error messages to help identify the problem area to correct. DO NOT FILL TANK until the problem has been corrected and the gauge is operating properly.
-***	Indicates a negative number. It may continue into the extended range until the gauge displays - E E -. For accuracy, the gauge should be re-calibrated. (*) Represents any numerical value, 0 through 9.
-EE-	Reading has gone below the extended range. Re-calibrate gauge to correct error.
EEEE	Measurement has exceeded the set capacity of the tank. This could be due to an overfill, or the float is resting on the bottom of the tank from improper installation. Check measurements and/or re-calibrate.
O--O	Indicates a problem with the electrical connection between the transducer on top of the tank and the gauge. Check all wires and connections.
LOBA	Low battery. Battery needs replaced. Contact distributor for authorized replacement.
ISLA	Interstitial leak. (Optional model)

PRIOR TO CONTACTING GREENLEAF GAUGE FOR TECHNICAL SUPPORT, PLEASE VERIFY ORDER INFORMATION, GAUGE SETTINGS, AND COMPLETE THE FOLLOWING INFORMATION.

1. Gauge Serial #_____
2. Order # (if known)_____
3. ***Accurate*** measurement from bottom of tank to top of pipe nipple_____
4. ***Actual*** capacity of tank. Refer to formulas below._____
5. Type of liquid in the tank_____
6. Current liquid level (inches or gallons) Please be accurate_____
8. Error messages displayed on gauge console_____
7. Changes or adjustments to original equipment_____

_____

9. Other information_____

_____

TO DETERMINE GALLONS PER TANK

Cylindrical tanks- measure in inches:

Length X Diameter X Diameter X .0034 = Gallons

(Diameter = Circumference divided by 3.14)

Rectangular tanks- measure in inches:

Length X Width X Depth X .004329 = Gallons

TECHNICAL ASSISTANCE

Greenleaf Gauge, Inc.
P. O. Box 309
Greenleaf, ID 83626
888-884-2843
208-453-1714
Fax 208-459-3365
E-mail: itm2@cableone.net
Web site: www.solargauge.com

SPECIFICATIONS MODEL EFG-8000

Supply Source.....Solar Cell - 5Volt
Backup power.....Nickel Metal-Hydride
Solar rechargeable battery - 9 Volt
Accuracy.....+ / - 1.0% optimal
+ / - 2.0% typical
Housing.....Plastic / Aluminum
6.0" H (9.0" W/ mounting Brackets) x 9.5"W x 1.5" D
mounting holes provided for 3" & 4" U-bolts. Holes: 5/16" & 7/16"
Indicators.....6 digit LCD digital
Operating Temperature.....-30° F to +140° F
Warranty.....1 year

IMPORTANT NOTICE: When gauge and alarm are utilized as the High-level warning, the test/reset button should ALWAYS be tested by the operator before tank filling. If it does not respond correctly DO NOT FILL. The operator must monitor the tank filling process and the status of the gauge and alarm to prevent overfills.

REPAIR AND RETURN POLICIES

REPAIRS

Your SOLAR GAUGE™ display module (left side of console) has been hermetically sealed at the factory. Once the gauge has been installed on the tank with the float it was designed to work with, and calibrated properly, it should give years of flawless service. In the event you have a problem with this product, it needs to be returned to Greenleaf Gauge for repairs. Contact Greenleaf Gauge for warranty status and detailed instructions before returning the product. Gauges covered by warranty will be repaired/replaced at the option of Greenleaf Gauge. Please refer to the Terms and Conditions of warranty. If the gauge is past the warranty period, it may be returned for a core credit toward the purchase of a new gauge providing there are no signs of misuse, abuse, damage, or attempted repair.

RETURNS

To return your gauge for repairs contact Greenleaf Gauge for complete details concerning warranty issues as well as shipping requirements. Contact us between 9-5 M-F MST : Local 208-453-1714, or toll free 888-88-GAUGE (888-884-2843). Our fax numbers are 208 459-3365, or 888-884-4145, or visit us online at www.solargauge.com.

Shipping
Greenleaf Gauge
20675 N. Friends Rd.
Greenleaf, Idaho 83626

Mailing
Greenleaf Gauge
P. O. Box 309
Greenleaf, Idaho 83626-0309

Sales Office
20675 N. Friends Road
P. O. Box 309
Greenleaf, ID 83626
USA

www.SOLAR GAUGE™.com
by
GREENLEAF GAUGE
A Division of I.T.M. Electronics, Inc.

888-884-2843
888-884-4145 - Fax
Outside USA
208-453-1714
208-459-3365 - Fax

Manufacturer's Suggested Annual Maintenance Protocol

For

SOLAR GAUGE™

by Greenleaf Gauge

(Without test port)

The EFG-8000 series of liquid level gauges operate as a very simple gauging devise with level alarm options that require almost no maintenance. Measuring the current liquid level in the tank and comparing the gauge reading to the charted amount can confirm normal gauge accuracy. The comparison between the gauge readout and the charted amount should differ no more than 2%, and typically operates with less than 1 % error.

The High and Low liquid level alarms are user set points in the gauge programming as a percent of the total tank capacity. Access to these alarm values may be reviewed by stepping through the setup program as detailed in the owners' manual*. The Low-level alarm may be set to "off" at a zero value or any value 5% under the High-level alarm value. The High-level alarm cannot be turned off and may not exceed 95% of tank capacity. We strongly recommend against setting the High-level alarm any higher than 90% in normal conditions.

Although this is not the preferred method, High Level alarms may be observed during filling as the liquid level reaches the set percentage of fill. The preferred method of a High level alarm activation, provided the tank level is above 50%, is to go into the setup program and adjust the High level alarm to just below the actual displayed level. This will trigger a High-level alarm. The last option is to temporarily unscrew the transducer** just up off the mounting nipple on top of the tank and very gently and slowly pull up on the beaded chain. This will simulate an actual High-level tank condition and activate the High-level alarm. Return the Transducer to the original position and secure all wire fittings.

*Owners' manuals are always available on the web at www.solargauge.com

**A EFG-TXD2- # (# is the size, i.e. A) transducer is available that provides a test port to pull on the probe without removing the transducer body from the tank nipple.

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888-884-2843
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Manufacturer's Suggested Annual Maintenance Protocol

For

The Interstitial Float Switch Assembly

The EFG-8000 series of liquid level gauges operates as a very simple gauging device with level alarm options, and an interstitial alarm option that requires almost no maintenance. This document is specifically about the interstitial float assembly operation and testing procedures.

The interstitial float device operates as a normally closed circuit device. An interstitial alarm will visually alternate in the LCD display by showing the letters "ISLA" and the gallons in the tank. This visual indicator will continue until the open circuit condition is cleared (the float returns to the bottom position). The Solar Gauge typically operates in a low power mode until it has sensed a greater than 2% tank volume change. When the gauge detects no liquid level change in the tank it goes into a power saving mode reducing the refresh timing of the display and alarm soundings. This is important to understand during testing of the interstitial float assembly and listening for the enunciation. Although the display will show the alarm in seconds, the enunciator may take up to approximately 90 seconds to enunciate the audible alarm - three short beeps. Once the alarm has sounded it will continue to enunciate approximately every 90 seconds until cleared.

Operational inspections must be done at least once a year depending on local inspector authority requirements. The preferred method of testing the assembly is removal from the interstitial cavity. (Note: pipe fittings must be provided above the interstitial cavity that allow for the inspection and removal of the interstitial assembly without disconnecting the communication wires.) Hold the assembly in your hand and inspect for liquid contamination past or present and document the findings. The preferred method of activation is by turning the assembly upside down. The float must fall freely and move to both extends when carefully shaken up and down. If the float does not move freely the assembly needs replaced. Next, holding the assembly upside down (wires coming out of assembly will be facing down), watch for the alarm message in the LCD display. You must hold this position until the three short beeps are heard. Another option is to temporarily place the assembly into a container of clean water, unleaded gas, or Av-Gas at least two inches deep (with the wires in an upright position). Test for the alarm under the timing conditions outlined above. **Diesel is not a recommended liquid to test in because it might show false contamination over years of testing.** With either method of testing, the float assembly should cause an interstitial alarm, which confirms correct operation of this device. When testing has correctly caused an alarm, carefully return the interstitial alarm assembly down into the bottom of the cavity and make sure all the pipe fittings are sealed against moisture.
If you have questions on your results please contact customer assistance*.
888-884-2843 between 9-5 M-F, MST.

*Owners' manuals are always available on the web at www.solargauge.com

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Manufacturer's Suggested Annual Maintenance Protocol

For

High Level Alarm testing using transducers with the test port*

(Manual activation of the high level alarm by direct simulation of a high liquid level)

Back Ground: The EFG-8000 series of liquid level gauges operate as a very simple gauging devise with level alarm options that require almost no maintenance. Measuring the current liquid level in the tank and comparing the gauge reading to the charted amount can confirm normal gauge accuracy. The comparison between the gauge readout and the charted amount should differ no more than 2%, and typically operates with less than 1 % error.

The High and Low liquid level alarms are user set points in the gauge programming as a percent of the total tank capacity. Access to these alarm values may be reviewed by stepping through the setup program as detailed in the owners' manual*. The Low-level alarm may be set to "off" at a zero value or any value 5% under the High-level alarm value. The High-level alarm cannot be turned off and may not exceed 95% of tank capacity. We strongly recommend against setting the High-level alarm any higher than 90% in normal conditions.

Preferred Method of Testing

1. Make note of the current gallons displayed. (Needed in step 5) The tank needs to be less than 75% full to perform repeatable tests, otherwise you may only get one alarm test until lower tank levels.
2. Go up on top of the tank to locate the transducer and unscrew the small hex nut. If your transducer does not have a test port one can be ordered to replace yours.
3. Carefully and slowly pull up (NEVER should more than 3 pounds of pulling force be applied) to the nut which is attached to a very small S.S. bead chain, which in-turn is connected to the probe down inside the tank. This needs to trigger a High-level alarm as you pull up (about 1 ½") and before it reaches the full length of pull. Depending on your current tank liquid level, you may have to reset the alarm for each pull up on the nut doing multiple tests. If you have a person in front of the gauge reading the display you can determine the quantity at which it alarms. It will be the percent setting of The High-level in the gauge program. The alarm trip point is set as a corresponding percentage of total tank capacity. IF THE HIGH LEVEL ALARM FAILS TO ACTIVATE PLEASE PROCEED TO THE SECOND PAGE, otherwise after successful tests proceed to step 4.
4. Feed the chain back down into the hole (checking placement and condition of the small O-ring, use a small amount of silicone grease if needed) and screw the hex nut carefully back into place. ONLY tighten it down enough to make firm contact against the o-ring to seal out the elements. If it is damaged or missing it MUST be replaced. If the o-ring has been damaged or it is missing, you must tape or keep in place a sealing cover over the transducer to keep the elements away from the nut until a replacement o-ring or replacement of the transducer can be made. Call Greenleaf Gauge for the protocol to replace this o-ring. It is serviceable in the field, but it is a delicate procedure. After considering all the conditions at your tank site, as an example; extreme cold, very tall tank, very remote location, it may be best just to order a new part and change out the existing transducer.
5. The last step is to check the current reading on the gauge display to see if it reads within 2% on the reading taken for step one. See back page for a example. If not you may try repeating steps two thru five to get the correct results or proceed to the last option.

Alternate Test Method: Although this is not the preferred method, High Level alarms may always be observed during filling as the liquid level reaches the set percentage of fill. This method is not preferred only because it is not always practical to be present to observe this event. You also only have one alarm event to observe. The *preferred method* of a High level alarm activation is provided on the transducer on top of the tank by means of a small hex nut assembly mounted on the 2" bell reducer.

Continued on page two

Last Option: transducer removal

1. The last option starts again with reading and making note of the current gauge display.
2. Next go up on top of the tank and temporarily un-wire and un-screw the transducer just up off the 2" pipe nipple on top of the tank. Depending on the site wiring means, it may require a small additional length of wire to re-connected to the gauge.
3. After temporarily re-connecting the three transducer wires and losing the 0--0 error code, very gently and slowly pull up on the beaded chain or the top of the probe sticking down in the tank. To do this it usually requires the transducer to be above the tank nipple about 5 inches Pulling up on the chain or probe will simulate an actual High-level liquid tank condition and will activate the High-level alarm. DO NOT handle the movable transducer rod which will normally only travel about 5/8 of an inch empty to full. Lifting up must activate the High-level alarm before the rod stops moving into the top up most position while lifting up on the bead chain or top of the probe. IF THE HIGH LEVEL ALARM FAILS TO ACTIVATE PLEASE PROCEED TOWARDS THE BOTTOM OF THIS PAGE.
4. Next you must test to make sure the transducer rod moves very freely in and out of the base. You can do this test by lift up slowly on the bead chain or probe top and let back down slowly several times just before re-assembly to the pipe nipple. If the transducer rod does not move freely and you can not clean it so it does, the transducer MUST be replaced.
5. Just before returning the transducer to the original position on the tank nipple make sure the small bead chain is loose. After screwing the transducer back down on to the tank pipe nipple and connecting the wires, check the current reading on the gauge display to see if it reads with-in 2% of the total tank capacity compared to the first reading you noted before you started this procedure.

% of Error Example: Total tank capacity 10,000 gallons. 10,000 X .02 would equal 200 gallons. The difference would then need to be less than 200 gallons plus or minus of the first and current reading.

6. If you are within the percentage of error then finish securing all wire and wiring means. If it is not, repeat the steps above because the rod may have been twisted and needs to be moved back and forth to the extreme ends again and then the transducer can be re-mounted carefully back into place and checked again for the % of error.

IF THE HIGH LEVEL ALARM FAILS TO ACTIVATE

1. Determine if the annunciator operates on the alarm plate, if not replace it.
2. Determine if there is moisture present behind the alarm plate. Dry out the cavity. Seal off all the conduit openings and replace alarm connector board if needed. DO NOT use any alarm board with any corrosion on it. It MUST be replaced.
3. Determine if gauge displays the correct quantity in the tank, if not, check the program settings in the gauge. Call if you need assistance determining the setup values.
4. If steps 1 thru 3 are found correct then the gauge may need removed and replaced.

IF YOU CAN NOT DETERMINE THE PROBLEM AND THEN ACTIVE THE HIGH LEVEL ALARM, PLACE A SIGN OF "NO HIGH LEVEL ALARM, OUT OF SERVICE" ON THE GAUGE FACE AND NOTIFY THE TANK OPERATOR. LEAVE THE SIGN ON THE GAUGE FACE UNTIL REPLACEMENT PARTS ARE AVAILABLE TO RETURN THE GAUGE TO NORMAL SERVICE. If you can determine that the gauge is reading the tank quantity correctly, but the High-level alarm is not sounding, make note of that to the tank operator.

*Owners' manuals are always available on the web at www.solargauge.com

*Pictures are available on the web site for clarification as to the different styles of transducers that have been produced.

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