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

www.SOLAR GAUGE™.com by GREENLEAF GAUGE

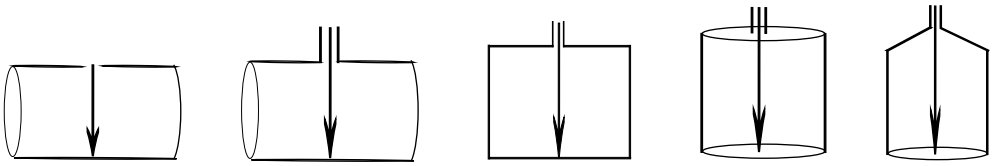
A Division of I.T.M. Electronics, Inc.

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

EFG-8000 User's Guide

You ***MUST:***

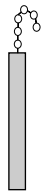
- accurately measure the tank from the top of the 2"pipe nipple or bung, that the transducer is mounted on, to the bottom of tank. Refer to drawings below.
- verify the ***actual*** tank capacity. Using the incorrect tank capacity will produce incorrect results. Refer to formulas on next page to compute tank capacities.
- ensure that the 2" NPT pipe nipple or 2" bung is vertically straight.



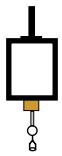
Measurement points

DO NOT PROCEED WITHOUT UNDERSTANDING THE FOLLOWING:

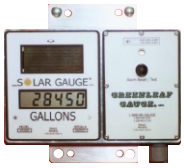
1. In an effort to preserve power, this unit has been put into a ***"SLEEP MODE"*** for storage and shipping. To take the gauge out of the sleep mode and prepare it for normal operation, touch the PLANET symbol on the front of the gauge with the red pocket magnet calibration tool. Hold the magnet on the PLANET symbol only long enough for the display to change. The gauge will display - - - - then go to normal operating mode. To go into programming mode, hold magnet on planet long enough for - - - - to appear. (See user's guide)
2. This 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 (or bung) 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. Follow the assembly instructions in the EFG-8000 USER'S GUIDE.

THE PROBE MUST NEVER TOUCH THE BOTTOM OF THE TANK DURING NORMAL OPERATION.

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.

ASSEMBLY INSTRUCTIONS: One set of instructions for unpacking and installing the gauge and probe on your new empty tank or to a tank already in use. Please follow these instructions carefully.

GAUGE CALIBRATION INSTRUCTIONS: The SOLAR GAUGE™ is a unique new product. The calibration is much like programming a digital watch. Please follow these instructions closely. You will be asked to determine 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 issues involved. ***Manufacturer's specifications requires any wire connections to the transducer and gauge, along with the 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 2.***

IMPORTANT NOTICE: This gauge and alarm is to be used only as an auxiliary warning, and should never be relied upon by the operator to prevent a tank overfill. The operator must monitor the tank filling process and prevent any overfills regardless of the status of any gauge or alarm.

HELP: For technical help please contact us at 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.

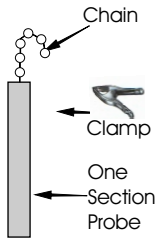


Figure 1

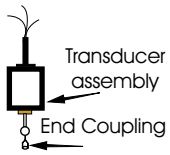


Figure 2

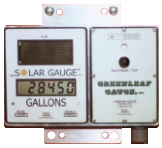


Figure 3

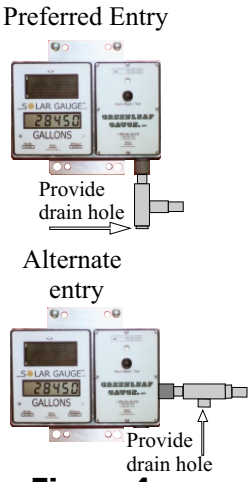


Figure 4

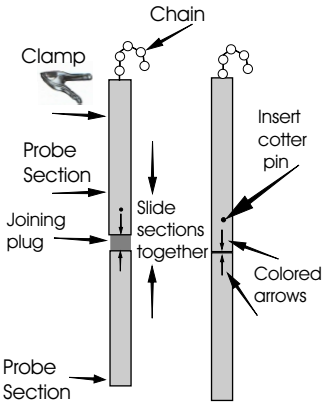


Figure 5

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. NOTE: Included in the information packet with the gauge, is a metal clamp. Attach the clamp near the top of the probe during installation. This clamp will keep the probe from falling into the tank during assembly. (See **Figure 1**) DO NOT REMOVE THIS CLAMP UNTIL INSTRUCTED TO DO SO AFTER CONNECTING THE PROBE TO THE TRANSDUCER.

2. Insert the probe down into the 2" pipe nipple. Be sure the clamp is attached near the top of the probe, and rests on top of the pipe nipple to eliminate dropping the probe into the tank. Apply a good pipe thread sealant to the 2" pipe threads. Connect the probe to the transducer assembly.

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**) Once this has been done, remove the metal clamp from the probe and 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 2" to 5" (depending on tank height) above the bottom of the tank when empty. Refer to INSTALLER NOTICE attached to gauge before installation.**

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 COLOR 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 directions inside the gauge console. Plug polarized 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. (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

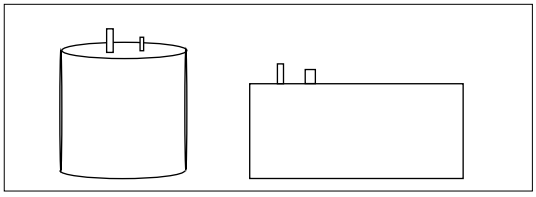
After removing the probe sections from the shipping container and removing the packing materials, it is necessary to connect the sections of the multi-section probe together. (See **Figure 5**) Sections may be lowered into the tank beginning with the bottom section, using the clamp referred to in step 1 above. As the sections are connected, move the clamp up and connect the next section. Carefully slide the sections together over the joining plug and align the matching colored arrows. After each section has been pushed together, insert the included cotter pin into the hole through the joining plug and spread. After the probe sections have been connected and the cotter pin(s) inserted properly, connect the multi-section probe to the transducer. To connect the probe to the transducer, follow instructions **#2 , #3 and #4** in above instructions.

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

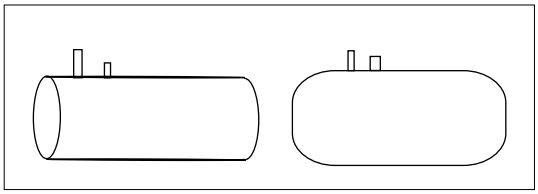
PROGRAMMING INFORMATION

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



OR



STRAIGHT TANKS **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
- 05 - 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 back up 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 at any % of tank capacity from 65% to 95% (as per instructions in calibration section of this user's guide). The alarm will enunciate until it is manually turned off by the operator, or the gauge will automatically turn off the alarm, and re-set it after five minutes of enunciation. 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 from 1% to 50% of tank capacity and will enunciate with a less frequent "chirp" 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).

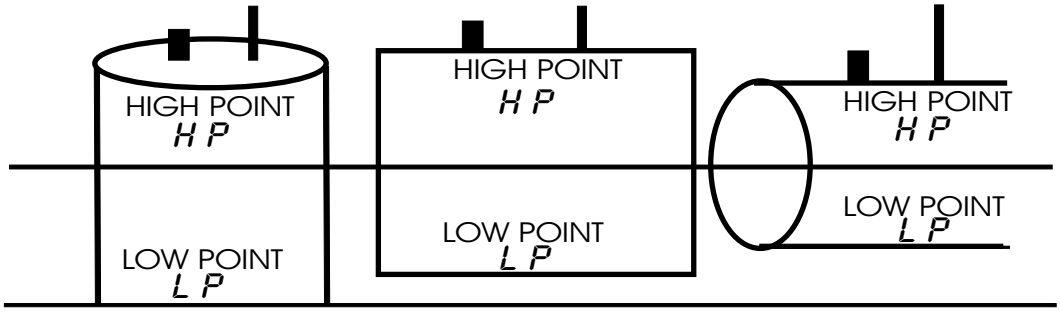
NOTE: **The individual filling the tank should always test alarm prior to filling the tank by use of the "Test / Reset" button (3-45 seconds) to be sure the alarm is in good working order.**

CALIBRATION INSTRUCTIONS

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

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

Typically, all gauges have been calibrated by the manufacturer to your tank specifications. Refer to gauge order information hand written on the front of this manual. If it is necessary to re-calibrate, follow these instructions carefully. **NOTE:** Calibrating your gauge can ***usually*** be accomplished by adjusting the **LOW POINT** calibration value **ONLY**.



The **LOW POINT** calibration value (-LP-) represents the number of gallons (or other measurable units) at the bottom of the tank that the gauge can not effectively measure. This value is equal to 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, 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 density of the liquid being measured. 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.

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 mathematic formulas in the trouble shooting section to compute the exact capacity of the tank.

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.

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 programing 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. Adjust the LOW POINT to compensate for most inaccuracies in the gauge reading. With vertical tanks this is a 1:1 adjustment. If gauge displays more than the actual amount, decrease the low point value by that exact amount. If the gauge displays less than the actual amount, increase the low point value by that exact amount. **EXAMPLE:** Actual volume = 500 gallons, gauge displays 450 gallons, current low level point is 100. To increase displayed amount increase the LOW POINT value by 50 (difference between actual volume and displayed volume) to a value of 150. Horizontal cylindrical tanks are adjusted in the same manner, however the change is not a 1:1 ratio, and my require more than one attempt to make the correct change. DO NOT 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.

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 50%. To turn off the low level alarm option, set 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 64% to 95 % of tank capacity.

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 -*OS*- 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. This feature can be used to account for the amount of "dead fuel" at the bottom of the tank which can never be pumped from the tank, or as an additional adjustment to the desired display on the gauge.

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 support please call us at 208-453-1714, or toll free at 888-88-GAUGE. (888-884-2843). Fax 208-459-3365, or toll free fax 888-884-4145.

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 &/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: This gauge and alarm is to be used only as an auxiliary warning, and should never be relied upon by the operator to prevent a tank overfill. The operator must monitor the tank filling process and prevent any overfills regardless of the status of any gauge or alarm.

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. Before returning the product, contact Greenleaf Gauge for warranty status and detailed instructions for returning the gauge. Gauges covered by warranty will be replaced at no cost to the customer, providing the terms of the warranty have been followed. Call Greenleaf Gauge at 208-453-1714 or toll free 888-884-2843 for instructions on returning the gauge. 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. Greenleaf Gauge can be contacted at 208-453-1714 or toll free 888-884-2843, our fax number is 208-459-3365 or toll free fax at 888-884-4145, or visit us on our web site at www.solargauge.com.

Repairs and returns will be handled by:

Shipping	*Mailing*
Greenleaf Gauge	Greenleaf Gauge
20675 N. Friends Rd.	P. O. Box 309
Greenleaf, Idaho 83626	Greenleaf, Idaho 83626-0309