

ET Gauge Model A



Evapotranspiration Simulator for Irrigation Management.

EtGauge measures crop water use directly.

EtGauge uses water at the same rate as your crop. It will show you when and how much to irrigate.

The ET Gauge helps you:

1. Prevent over and under irrigation.
2. Improves turf health.
3. Avoid wasting water, energy, fertilizer, topsoil and labor.

Covered ceramic evaporator mimics solar absorption and vapor diffusion Resistance of an irrigated crop. Growers appreciate the convenience of this tool. It is as easy to use as a rain gauge.

Patented EtGauge is used by farmers, irrigation consultants, and government agricultural personnel in 23 countries.

Rain entry prevented by a check valve. Requires distilled water.

Package includes:

- Stainless steel mounting bracket.
- Rain gauge.
- Irrigation management information and tables.



ETgage Instructions

EXPLANATION OF DIFFUSION COVERING

An ETgage comes with a diffusion covering that goes over the ceramic evaporation cup. A number is written on the canvas fabric where the draw strings come out. An evaporation cup is shipped with the Style # 30 covering. When installing a different covering be sure it fits tightly on the cup with NO air space between the covering and the top flat evaporation surface. Note how the draw strings of the canvas cover are both wrapped tightly in one direction around the neck of the ceramic and then secured with the Velcro strap.

The Style # 30 canvas covering with the evaporation surface mounted at an 1 meter height gives ETgage readings which equate well with grass reference Evapotranspiration. More than eight years of research and data have been compiled on canvas covers.

SETUP, INSTALLATION, OPERATION, AND MAINTENANCE

Figures 1 and 2 show the basic components of the ETgage Model A (Modified Atmometer). Under the green canvas cover is a ceramic plate which if properly maintained will provide years of reliable service. As shipped, the ETgage device is ready to use. For succeeding years' use, it is important that the Maintenance Procedure described below be followed.

DO NOT leave the ceramic plate in an enclosed vehicle because extreme high temperatures can warp the plastic and melt the glue

- (1) Invert the green, fabric-covered ceramic plate and fill with distilled water. Let the plate soak for 15 minutes while keeping it full. There is a small metal vent tube next to where the ceramic plate is filled. Also fill the reservoir supply bottle 3/4 full with distilled water.
- (2) The ETgage Model A has a check valve consisting of a diaphragm mounted in a section of silicon tubing attached at the lower end of the glass supply tube. To prime, put the lower end of the glass supply tube with the check valve in distilled water and then suck water through the check valve and glass tube until completely full with no major air bubbles. If you suck too hard on the upper end of the glass tube, you may invert the diaphragm in the check valve causing the check valve not to work and water will not stay in the glass supply tube. The diaphragm can be easily re-inverted by removing the glass tube end with bushing sleeve and bronze washer from the silicon tubing holding the check valve and then use the upper end of the glass tube to push the colored diaphragm down and back into place.
- (3) Holding the inverted ceramic plate top by the grey plastic, insert the rubber stopper without the long glass tube and check valve into the neck of the filled ceramic plate by turning and pushing firmly on the rubber stopper. Water will squirt out the short glass tube that is in the rubber stopper. A good seal between the stopper and the ceramic plate is very important so be sure the stopper is tight in the neck.

- (4) Insert the rubber stopper into the ceramic neck if the long glass supply tube with check valve are already attached to the rubber stopper because the compressed water will break the ceramic plate.
- (5) Still holding the ceramic plate top by the grey plastic, attach the water filled glass supply tube/check valve to the rubber stopper with the short piece of tubing that is on the upper end of the glass supply tube. The two glass ends in this short piece of tubing should touch.
- (6) Immediately insert the ceramic plate/supply tube setup in the reservoir supply bottle. The grey plastic of the top plate is secured to the top of the bottle by the two spring clips. Before snapping the top assembly down, fill the reservoir bottle to the zero mark on the scale. See later page of these instructions for notes on Reading the Sight glass.
- (7) If the bottle is overfilled the top of the glass sight tube can be easily removed from under the top sight tube fitting and the excess water then drained out through the top end of the glass tube. To remove the top end, pull down on the glass tube while pushing the glass tube to the side at the flexible clear tubing on the bottom sight tube fitting.
- (8) The ETgage is now ready for field use. Be sure to use only distilled water for filling and if need be washing off the flat, canvas covered evaporating surface. If the green canvas becomes very dirty, remove the canvas and wash in warm water. When removing the green canvas cover, note how the string is wrapped tightly in one direction around the neck of the ceramic. It is important that the canvas be put on tight so that there is NO air space between the canvas and the top flat surface of the ceramic plate.
- (9) If the reservoir bottle goes dry, re-do the filling procedure described above. If the ETgage suddenly stops evaporating, re-do the filling procedure -- the stopper may have loosened allowing air to enter the ceramic plate.

PROTECT FROM FREEZING.

Install after the last spring frost and remove before the first fall frost.

Figure 3 shows a typical field setup using a wooden post to mount the ETgage along with a rain gage. The flat, green evaporating surface of the ETgage should be level and at a height of at least 30 inches (1 meter) above the ground/soil surface. Secure the stainless steel mounting bracket to the side of the post with the two screws provided. If the top of the post is 37 inches above ground surface and the top of the mounting bracket is placed 1/2 inch below the top of the post, then a 39 inch height for the ETgage will be obtained.

The top of the rain gage should also be above the top of the post and a thin layer of non-detergent/household oil in the rain gage will keep evaporation from occurring. Provided with the ETgage is a stainless steel wire with a white bead on top which can be stuck in the top of the wooden post to keep birds away.

The ETgage should not be mounted in the shade. Do not put the ETgage under a sprinkler because sprinkler water can contain substantial salts which could plug the top ceramic evaporating surface.



The depth of water evaporated from the ETgauge is measured directly with the attached scale from the change in water level in the sight glass. The difference between readings is the ET over a period. The attached scale is graduated to tenths of an inch or millimeters. With the clear glass sight tube, accurate daily readings can be obtained. Taking readings the same time each day is recommended. To be sure the water level in the glass sight tube is stabilized, squeeze the tubing at the bottom of the glass sight tube which will cause the water level to bounce and reach a stable level. After refilling the bottle, this is recommended to help clear possible dust from the glass thereby obtaining a good stable reading for zeroing.

During very heavy rainfalls, the thicker canvas covering can absorb rain water thereby delaying resumption of ET measurements. This absorption can result in lower ETgauge readings by 0.02 to .05 inches.

Two sliding red markers are provided on the sight glass to keep track of water use and/or limits on allowable soil water depletion.

The ETgauge can help tell when to irrigate and the amount of water used by the grass since the last irrigation. The ETgauge with the Style # 30 canvas diffusion covering evaporates water similar to a golf green, a well-irrigated lawn or turf crop.

The ETgauge's evaporating surface is a physical model of the energy balance and vapor diffusion transport process involved in turfgrass evapotranspiration. Using the ETgauge to tell when to irrigate and the amount needed improves water management efficiency and saves dollars. Inefficiency means under irrigation is stressing grass and over irrigation is wasting water and fertilizer below the root zone.

Correlating Readings

- 1) Compare the ET readings between irrigations to what's caught in Precipitation and Uniformity gauges spaced evenly between the sprinkler heads. This will give the actual amount applied to the turfgrass area over a given irrigation cycle along with the uniformity of delivery.
- 2) Use the multiplier to find actual water needs of the turfgrass area.
- 3) Usually a multiplier of .70 is used to determine water needs of each green. Some soils will use a multiplier of .66 and others .75; however the standard is a .70 will usually give accurate ET rate information.
- 4) Compare the ETgauge readings to the Moisture sensor readings from one to four inches in the profile. Be sure the soil moisture is actually in the water requirement range before applying additional irrigation. Using this comparison will allow you to adjust the multiplier for your specific soil requirements. Example: If the ET gauge reads that 1/2 inch of water (.50) you would multiply .50 (ET) times .70 (Multiplier). The amount if irrigation you need to re-apply to the area is 0.4 inches.
- 5) Also Infiltrometer readings will show the amount of water actually going into the soil during an irrigation cycle. This will insure that the water applied will actually percolate into the soil profile instead of running off the area.

Storing ET Gauge



- 1) After removal from the post in the fall, disassemble, remove green canvas cover, and drain out all the water. At this time the ceramic plate should be cleaned and reconditioned.
- 2) Clean the ceramic plate without the canvas attached in a weak solution of one tablespoon of regular household bleach per two gallons of warm water by soaking the ceramic plate in this solution for 15 minutes.
- 3) After this initial soaking, the top flat surface of the ceramic plate should be wet sanded with the 240 grit, very fine sand paper attached to these instructions.
- 4) Under a running water faucet, lightly and evenly sand the flat top surface to restore and recondition it to a uniform white color. This sanding is recommended once a year.
- 5) After sanding, re-soak the ceramic plate in the weak bleach solution for another 15 minutes.
- 6) Finally rinse and soak the plate in clean warm water for at least 30 minutes. Never use any detergent to clean the ceramic plate. Store the uncovered ceramic plate where it can dry completely.
- 7) The inside of the reservoir supply bottle and the check valve should also be cleaned by soaking with this weak bleach solution and then rinsed well with clean water.
- 8) Be sure the vents through the top grey plastic plate and through the top sight tube fitting are open.
- 9) To test if a ceramic plate has a clean, well-conditioned surface, pour a small amount of distilled water over the top, flat white surface of completely dry plate.
- 10) The surface should soak the water up quickly and evenly with no shiny, un-soaked spots. Re-sand as described above if soaking is not uniform.

Warranty

The reliability and accuracy of the ETgage is a direct function of proper installation, operation, and maintenance by the purchaser. This product is warranted against defects in materials and workmanship for one year. During the warranty period, we will repair or, at our option, replace, without charge for parts and labor, a product that proves to be defective. This warranty does not cover transportation costs, and it does not apply if the product has been damaged by accident, or by misuse, or by modification. No other express warranty is given. The repair or replacement of a product is your exclusive remedy. Except as provided herein, we make no warranties express or implied, including warranties of merchantability and applicability for a particular situation. In no event shall we be responsible for consequential damages. Products are sold on the basis of specifications applicable at the time of manufacture.

Diffusion Covers

The ETgage uses three different top covers to provide appropriate resistance to water vapor as it leaves the instrument. These covers are identified as Style #30, Style #54 and Style #C2. You will find the number stamped on the edge of the cover.

The green-colored covers rest on top of disposable “wafers”. The cover/wafer combination sits on top of the ceramic evaporator cup. The cover receives energy from sunlight and air and provides appropriate vapor diffusion resistance. The wafer keeps rainwater from entering the instrument. Cover and wafer simulate a canopy of leaves.

Canvas Covers

Use the canvas covers when you mount the ETgage in an open area or above the plant canopy of leaves.

Use the #30 for turf grass. An ETgage with #30 cover simulates grass reference evapotranspiration (ET_o).

Use the Style #54 canvas cover for agricultural crops. An ETgage with #54 cover simulates alfalfa reference ET (ET_r). (ET readings with a #54 cover will be in the range of 10% to 15% greater than that of a #30 cover.)

Thin Polyester Cloth Cover, Style #C2₁

Use the #C2 cover when you mount the ETgage *within* the plant canopy. The top of the ETgage must be level with the top of the plants. #C2 will fade in sunlight, but that will not affect your results. You can turn the #C2 cover inside out without affecting performance. Use #C2 to simulate the plant canopy ET of any crop.

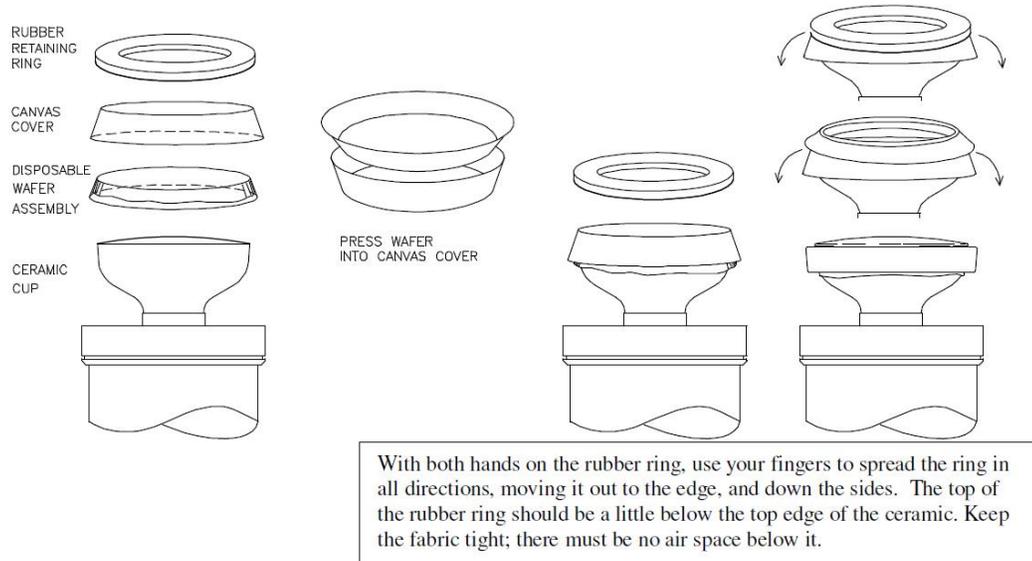
₁ Style #C2 replaces the ETgage Style #G2 cover. It has the same characteristics as #G2. Use with a wafer.

Your ETgage is fully assembled and ready to use. It was shipped with a Style # _____ cover mounted on the evaporator.

Other covers are in the can.

See instructions starting on page 1 for filling, priming and field installation.

“Wafer” Evaporation Element (for use with all covers)



Use Distilled Water Only Protect From Freezing

Do not use tap water or mineral water

Do not clean the porous ceramic surface or the wafer with soap or detergent. This would interfere with their water wicking properties.

“Wafer” Evaporation Element (for use with all covers)

For low maintenance, use a disposable ETgage "wafer" between the green fabric cover and the ceramic evaporator surface.¹ The wafer will protect the ceramic from accumulated contamination. When you remove a wafer, the ceramic should look wet.

Any residues left as water evaporates will accumulate in the wafer instead of on the ceramic; but you must still use distilled water to minimize contamination. Tap water or mineral water will damage the wafer.

The wafer will last about a growing season. Eventually you will see hard crusty areas on the top of the wafer. These areas block evaporation, and they will reduce the evaporation rate by an amount proportional to their size, which leads to error.

Replacing the wafer will bring evaporation back to the correct rate.

The top layer of the wafer sheds any rainwater that gets through the canvas. At the same time, it allows water *vapor* to pass freely.

If the fabric cover becomes very dirty, remove and wash it in warm water (not hot water). If you use soap, rinse thoroughly.

For the Style #C2 cover, install a wafer on the ceramic cup first, then center the cover on top of it and install the rubber retaining ring.

¹The evaporation rate will be the same if you do not use a wafer, but without it, the ceramic surface will slowly become contaminated, and it will require vigorous sanding about every 4 months (use a medium grit silicon carbide abrasive paper under running water). Also without the wafer, rainwater will seep through the canvas cover and be pulled into the instrument's reservoir.