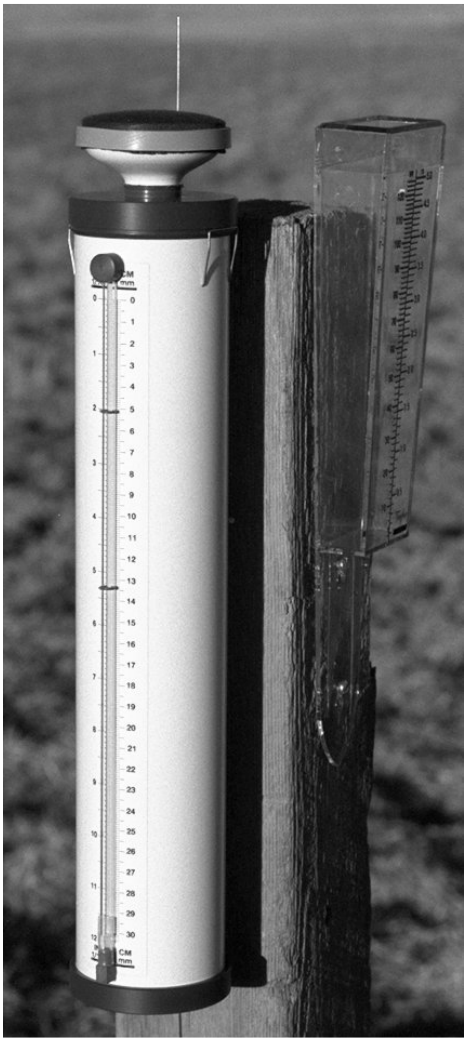
ETgage Model A Instructions

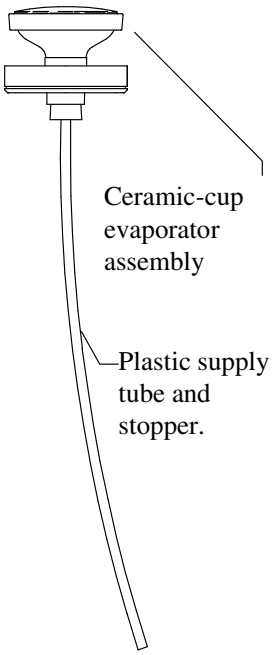


- The ETgage is ready to use.
- *Use only distilled water*. Distilled water can be purchased from a local grocery store.

FILLING AND PRIMING THE MODEL A

(1) Remove the ceramic top, which is secured with spring-clips. Remove the rubber stopper with its plastic supply tube. The stopper may be tight but wiggle it free. Fill the ceramic cavity with distilled water, allowing the porous ceramic walls to soak up, and then top it off with more water. Fill the water reservoir (the white cylindrical body of the ETgage) to about three quarters full.

(2) Re-insert the rubber stopper and supply tube into the neck of the ceramic part. Push and turn the stopper firmly into place. Water escaping from the cup will fill the supply tube. Since a good seal between the stopper and the ceramic cup is necessary to keep air out, be sure the stopper fits tightly in the neck.[1]



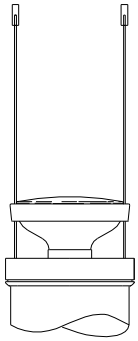
(3) Now clip the top assembly back onto the reservoir. Before snapping the top assembly down, fill the reservoir to the zero mark on the scale. (See a later page of these instructions for notes on Reading the Sight Tube.) If the bottle is too full, you can drain out excess water in a controlled manner by detaching the sight tube at its *upper* end. To do this, push the lower end to the side and pull down. The upper end will come free. Tilt the sight tube to allow water to drain.

The ETgage is now ready for field use. Be sure to use only distilled water. If the green cover becomes very dirty, remove and wash it in warm water (not hot water). Rinse thoroughly if soap is used. The canvas cover should fit snugly to eliminate any air space. If the reservoir goes dry, repeat the filling procedure described above.

[1] A little air remaining in the supply tube does not matter. Air may accumulate in the ceramic cup over time, but the water will wick up the walls to reach the evaporating surface. A cup will continue to work properly even when almost empty, but to avoid temperature sensitivity due to expansion and contraction of the air, refill it when replenishing the reservoir.

FIELD INSTALLATION AND LOCATION

A typical field setup uses a wooden post to mount the ETgage and rain gauge. The green evaporation surface of the ETgage should be level and at a height of at least 39 inches (1 meter) above ground (soil surface). Mount the stainless steel bracket to a 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 a half inch below the top of the post, the evaporating surface will be at 39". The top of the rain gauge also should be above the top of the post, and a few drops of oil in the rain gauge will stop its water from evaporating. Use a non-detergent oil such as household sewing machine oil.



Two stainless steel “bird wires” are included with the ETgage. They should be mounted under the silicone rubber ring that holds the cover on the ceramic cup. The 6-inch long wires are held vertically by inserting their bottom ends in small holes located on the surface of the gray plastic top. The wires will keep birds from perching on the instrument and fouling it.

Turf Grass

For landscape irrigation, use the ETgage with a Style #30 canvas cover for estimating grass ET. The best landscape location is an open area of turf not shaded by buildings. The location should represent the turf being managed. Landscape settings are composites of many irrigation zones of turf and shrubs. The water use or evaporation from these various micro climates may be different from evaporation at the ETgage site. Use the ETgage as a reference to help in setting the sprinkler controllers. For example, a turf island in the middle of a hot parking lot will have a higher multiplier than a large open area of turf grass that is not influenced by hot asphalt. Factors can be determined by trial and error: try a multiplier and see if the grass looks good without wasting water. This will become the factor for that area and will also include the efficiency of the irrigation system.

Agricultural Crops

An example of a good location for the ETgage in an agricultural setting is a border ridge in an alfalfa field. However, it may also be located for easy access alongside a dirt road if surrounded by low-growing irrigated crops. The location of the ETgage should represent the irrigated acreage, and should not be shaded or blocked by tall crops. Placing the instrument in a dry, fallow field, near farmstead buildings or near hot pavement generally will give high readings.

If used within a cornfield, the ETgage should always be mounted at least 1-foot above the canopy of the crop when using the Style #54 canvas cover. This is necessary for adequate exposure to sun and wind in the tall crop. When corn is at least 1-meter high, the Style #C2 cover may be used. This diffusion cover is a good simulator of the canopy; but for Style #C2, the top of the ETgage must be maintained at a level even with the top of the canopy.

Do not put the ETgage under a sprinkler because minerals in the water could plug the evaporating surface. Instead, place it at the edge of a sprinkler-irrigated field.

The *rain gauge* can be set under the sprinkler, on a separate post. This will allow the application amount to be compared to crop water loss. Use the comparison to find application efficiency.

With a style #54 canvas cover, the ETgage will estimate the evapotranspiration of a green well-irrigated crop. This alfalfa reference evapotranspiration, or ETr, assumes the crop covers or shades at least 75 percent of the ground surface. For row crops early in the season, the canopy of leaves will not shade 75 percent of the soil, and a crop coefficient, Kc, should be used to multiply the ETgage reading. For a typical alfalfa stand, a nine-inch crop height corresponds to about 75 percent ground cover. For small grains, 75 percent cover comes at about mid-boot stage, two weeks before heading. For corn, it is about two weeks before tasseling. For ground covers below 75 percent, use the following table to find a crop coefficient multiplier:

Percent ground cover	Kc
Above 75%	1
50%	0.8
25%	0.5
Below 10%	0.3

READING THE SIGHT TUBE

Water evaporated is measured directly by the sight tube on the side of the reservoir. A one-inch change in water level corresponds to one inch of reference ET. Note that the scale under the sight tube is calibrated in tenths of inches and millimeters. There is a short flexible connecting tube at the bottom of the sight tube. Squeeze this tube several times to force the water to rise and fall, allowing the water in the sight tube to find its natural level. By doing so, you can make repeatable readings to about .02 inch. For accurate sight tube measurements, eliminate any bubbles in the glass tube or its bottom fitting. If there are bubbles, remove them by first slipping the sight tube down and out of its top fitting, and then blowing into the tube to force water back into the reservoir. The water will come back into the tube without bubbles.

Two sliding red markers are provided on the sight tube to help you keep track of water use. They can also mark limits on allowable soil water depletion.

During heavy rainfalls, canvas covers may absorb rainwater. The absorbed water delays resumption of evaporation from the ceramic cup. This absorption can result in lower readings (an error of -0.02 to -0.05 inch).

To find reference ET for one day, take two measurements 24 hours apart and find the difference. Two measurements a month apart will show ET for the month, and average daily ET is found by dividing by the number of days. For purposes of determining irrigation requirements or irrigation efficiency, you may only want to take readings at the beginning of each irrigation. A general irrigation efficiency can be computed as the ratio of irrigation water actually used by a crop divided by water applied. Subtract rainfall from the ETgage measurement for an estimate of irrigation water used.

FREEZING CONDITIONS

Your ceramic evaporation cup was shipped with a roll of plastic foam[2] inside to protect it from breaking under the pressure of expanding ice in freezing conditions. If temperatures will never drop below freezing, the foam roll is not necessary and may be removed.

Protection against freezing is limited, however. Water in the ceramic cup freezes from the outside inward. As water turns into ice, it expands greatly (9% in volume) putting the remaining water under pressure if restricted. When the neck freezes, remaining water inside will burst the ceramic if it has nowhere to go. The roll of foam plastic provides relief, but only if it is not already encased in ice. If after freezing solid once, the cup thaws only partly, and the foam roll remains in a block of ice, it will not protect the cup from bursting. You should not rely on protection after the first freeze if you expect re-freezing conditions without complete thaws.

The reservoir of the Model A instrument does not appear to be damaged by being frozen solid once. But it too will burst after a succession of freezes with partial thaws.

LIMITED WARRANTY

The reliability and accuracy of the ETgage are functions of proper installation, operation, and maintenance. 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 is defective. This warranty does not cover transportation costs. 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 from specifications applicable at the time of manufacture.

[2] The foam roll is made of a 2-inch x 2-inch square of 1/8th-inch thick closed-cell polyethylene foam sheet that has been set at 150°F into a tight roll.

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