

KEL INSTRUMENTS CO., INC.

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"KELWAY® PRODUCTS"

KELWAY SOIL® ACIDITY AND MOISTURE TESTER MODEL HB-2

READ these instructions BEFORE USE especially sections III, IV, V, and VI.

I. **Description**

The Kelway Model HB-2 provides the ability to make on the spot-in the field or in the lab-tests for soil acidity in moist soil. No power sources are needed. Readings are shown on 2 meter scales, pH and moisture. Accurate readings can be obtained by following instructions and long unit life is insured by proper handling.

II. **Brief Theory**

The Kelway Soil Acidity Tester, Model HB-2, measures pH (degree of acidity) and moisture content (% relative saturation). The pH reading utilizes a tiny flow of current through the two metal plates located on each side of the unit's housing. Since the current flow is so small, these metal plates must be kept clean (*please refer to section VIII.A*). Because the HB-2 utilizes metal plates instead of the conventional "Glass Electrode" commonly used in laboratory pH testers it has certain advantages. Primarily there is the portability factor plus ease and speed of testing and the complete elimination of "buffer solutions". As a result you don't have to be a "scientist" to use an HB-2! However, the use of metal plates can cause some confusion if you try to test highly saline alkaline soil. The metal plates can be fooled by the presence of the soluble salts in such soil and can give erroneous readings. The HB-2 should not be used in this type of soil. Since most soils are acidic (and tend to increase in acidity as time passes) this is not a common problem. If you are in an area of known saline, alkaline soil, you must correct the problem prior to using the HB-2.

III. **Preparations Before Use and Some DO and DON'T Tips**

- A. The HB-2 has been quality control checked before shipment. If for some reason the meter indicator is not pointing to a pH reading of 7 on the upper scale, refer to the section entitled "Calibration" before proceeding.
- B. READ ALL INSTRUCTIONS BEFORE USING THE HB-2.
- C. Never force or jam HB-2 into hard earth.
- D. Do not measure liquids. This unit has not been designed to measure liquids. If liquids enter the unit and contact the circuitry, damage can occur which will not be covered by the guarantee. By liquids we mean water as well as acids.
- E. Do not attempt to remove the metal tip. If it loosens, tighten it by turning it clockwise. Do not grasp it directly with a metal pliers. Protect it from damage with a piece of non slip rubber or similar protection before tightening.
- F. Avoid using the tester near magnetic objects.
- G. Do not hold the unit with fingers on the metal plates. Fingerprints are greasy and will reduce the flow of current. Always keep the metal plates clean. See "Maintenance Tips"

IV. **Instructions for Use to Measure pH**

- A. Tester's plates must be chemically clean and totally free of contamination. The metal plates must be rubbed clean before use with the Kelway Conditioning Film provided. See "Maintenance Tips".
- B. Soften the soil in the spot to be tested. Break up pieces if it is hardened. Remove grass, leaves, pebbles and other debris.
- C. Gently insert tester vertically into the softened soil so that the metal plates are fully covered. Press the soil tightly around the tester so that the metal plates are in close contact with the soil.
- D. Read the pH on the upper scale. Generally the tester indicator needle makes a swing to the right and then drops to the correct pH reading, where it stabilizes in 2 to 3 minutes. Your proper reading should be made at the time of stabilizing. A little practice will help you to get correct readings easily.

NOTE: Reading pH requires some soil moisture to be present for proper operation. If the tester's indicator needle does not deflect during the 2 to 3 minute pH test period the soil may need moisture. Moisten the soil slightly. Distilled water is preferable. Tap water introduces its own pH and generally requires several hours of stabilizing before you can make your reading.

- E. After use, wipe the plates clean with a paper towel to remove all dirt particles. Remember to use the Kelway Conditioning Film before your next reading. See "Maintenance Tips"

V. **Instructions for Use to Measure Moisture**

- A. Tester's plates must be chemically clean and totally free of contamination. The metal plates must be rubbed clean before use with the Kelway Conditioning Film provided. See "Maintenance Tips"
- B. Soften the soil in the spot to be tested. Break up pieces if it is hardened. Remove grass, leaves, pebbles and other debris.
- C. Gently insert tester vertically into the softened soil so that the metal plates are fully covered. Press the soil tightly around the tester so that the metal plates are in close contact with the soil.
- D. Press the button to read moisture content on the lower scale. Hold the button in the depressed position. This also requires a 2 to 3 minute stabilization period.
- E. The reading you are obtaining is percent relative saturation. It is not percent moisture by weight. Each type of soil has its own FIELD CAPACITY — meaning its own ability to hold water — after it has been irrigated and drained. This could be termed "relative saturation"

Examples: Fine Sand would hold about 32%.
Loam might hold 45%.
Clay could hold 65%.

At these ranges each of these soils would be saturated or at their Field Capacity and the HB-2 would read 100%.

- F. After use, wipe the plates clean with a paper towel to remove all dirt particles. Remember to use the Kelway Conditioning Film before your next reading. See "Maintenance Tips"

VI. Calibration

- A. Unscrew cover, taking care not to break glass or lose gasket.
- B. Do Not attempt to remove meter. Meter removal voids guarantee.
- C. Carefully insert a small screwdriver tip into the calibrating screw slot and VERY GENTLY turn screw to bring needle to a position where it points to 7.0 on the pH scale. DO NOT turn the screw far enough for the needle to go off the scale (either way) or you will do damage which will either stop function or reduce accuracy. This is an easy adjustment to accomplish if care is taken and instructions followed.
- D. Replace gasket, glass and cover. Gently tighten cover.

VII. Typical Problems

Tester's indicator needle does not deflect when tester is inserted in soil.

Likely Causes

- A. Plates are dirty or oily or not chemically clean. Clean them with Kelway Conditioning Film. See "Maintenance Tips"
- B. Soil is too dry to conduct current. Check moisture reading or just add water to moisten the soil, tamp the soil against the (clean) plates and obtain reading. See Section IV.D.

VIII. Maintenance Tips

- A. Keep the plates clean. Avoid fingerprints or oily marks which stop the flow of current. Clean the tester before use. Wrap the enclosed Kelway Conditioning Film around the plate surface and rotate the tester back and forth 2 or 3 times. Additional sheets of Kelway Conditioning Film are available from Kel Instruments Co. at a modest cost. Wipe and rub clean with a soft rag or paper towel. Plates should always be kept clean.
- B. DO NOT use in liquids. Moisture may seep inside and cause corrosion.
- C. Try to keep the button and the area around the button clean and dry. Dirt and moisture should be dislodged, blown away or gently wiped. Never submerge the tester in moist soil so deeply that dirt or moisture can get into the button area.
- D. Avoid magnetic objects.
- E. Keep conical tip tight and clean.
- F. Never take the meter out or apart. This is a job for a trained serviceman. Kel Instruments Co. provides efficient, modestly priced service should you damage your tester.
- G. Avoid rough handling.

IX. Changing Soil pH

The chart below offers a general guide for changing the pH of two types of soils, namely sandy loam and loam through the addition of limestone. For other types of soil, consult suitable technical literature, check with your local state or USDA office or try the trial and error method.

In determining the pH of the area under test it is wise to consider spot checking a variety of individual places since it is often true that small variations occur within the area.

Limestone Recommendations to Change Soil pH to 6.5

SOIL pH	Sandy Loam Soil		Loam Soil	
	lbs./Acre	lbs./1000 Sq. Ft.	lbs./Acre	lbs./1000 Sq. Ft.
4.5	5000	120	7000	160
5.0	3500	80	5000	120
5.5	2500	60	3000	70
6.0	1000	25	2000	45

To change Soil pH to less than 6.5, subtract recommendations given at desired pH from that of the original pH and use the difference.

Example: Soil Test pH 4.5 Desired pH 5.5
 Recommendation 5000 lbs. Recommendation 2500 lbs.
 difference - 2500 lbs. or
 amount necessary to change the pH of a sandy loam soil from pH 4.5 to 5.5

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GUARANTEE

Your Kelway Soil Tester Model HB-2 can be counted on to perform well for you for many years if given reasonable care, and if the enclosed instructions are followed. The tester is guaranteed for a period of six (6) months from date of purchase against defective workmanship or materials. Any defect due to defective workmanship or materials that should arise during the guarantee period will be repaired without cost. It is the obligation of the purchaser to return the tester to Kel Instruments Co. for this service. This guarantee does not apply to any damage caused by abuse or accident.

After the guarantee period, if your HB-2 is dropped or damaged or becomes inoperative, you are assured of prompt repair service. Send the unit to Kel Instruments Co., and a free, no obligation estimate of costs will be provided.