

## ASPHALT OR HARDENED CONCRETE SITE

### NOTE

These directions also apply to taking a backscatter measurement on soil.

Locate a smooth site on the asphalt. Fill the voids on open mixes with sand or cement, ensuring that the total area filled does not exceed approximately 10 percent of the bottom area of the gauge. **The gauge base must rest on the asphalt, not the fill material!** Ensure that the gauge does not rock. To ensure accurate readings, the gauge base must be completely in contact with the test material. If the gauge rocks, find a more suitable test site. If taking a measurement around a core, the gauge may be moved a few inches from the core to level it.

## OFFSET FUNCTION

The gauge can be adjusted using an offset. The gauge applies the offset to measurements until the offset is disabled or the gauge is turned off. The gauge provides three offsets: *density*, *moisture*, and *trench*.

Press **<OFFSET>** to access the **Offset** menu.

### DENSITY OFFSET

To use a density offset, press **<1>** from the **Offset** menu. The **Density Offset** menu shows the current density offset on the second line. Press **<1>** to enable the displayed density offset or **<2>** to disable it. To enter a new density offset, press **<3>**. The gauge prompts for the density offset. Select the offset sign (positive or negative), enter the density offset, and press **<ENTER>**.

### MOISTURE OFFSET

To use a moisture offset, press **<2>** from the **Offset** menu. The **Moisture Offset** menu shows the four stored offset values (if any) and the *New* and *Disable* options. To select a stored offset value, press the number key that matches the displayed value.

To enter a new offset value, press **<5>**. At the **Select Offset Source** prompt, press **<1>** to enter a moisture offset manually, or **<2>** to allow the gauge to derive the offset value. Follow the gauge prompts to enter or derive the offset value. Upon completion, the gauge displays the prompt **Save This Value for Later Use?** Press **<NO>** to enable and use the offset without storing it, or **<YES>** to enable the value and store it in memory. The gauge can store the value in one of four *memory cells*. Storing a new value in a cell will erase the old value. At the **Select memory cell** prompt, use the number keys to store the value.

To disable the moisture offset, press **<6>** from the **Offset** menu.

## TRENCH OFFSET

To use a trench offset, press **<3>** from the **Offset** menu. The **Trench Offset** menu shows the current offset values on the second line. To enable the displayed trench offset, press **<1>**. To disable the trench offset, press **<2>**. To enter a new trench offset, press **<3>**. As prompted by the gauge, select a position inside the trench and the same distance from the wall as the test measurements. Place the gauge on the standard block in this position, set the source rod to the **SAFE** position, and press **<ENTER/START>**. The gauge performs a trench count, calculates the trench moisture and density offset values, enables the trench offset, and returns to the **Ready** screen.

The trench offset is active for moisture measurements at all source rod positions, and for density measurements in backscatter position and direct transmission positions of less than 4 inches.

## TESTING AND MEASUREMENT

Before taking any measurement, set the measurement mode by pressing **<MODE>**, then press the number key that matches the desired mode. Check the count time. Enter a target value, if desired. Prepare the test site.

To begin a reading, lower the source rod and press **<ENTER/START>**. In the *Automatic* depth mode (Model 3440 Plus only), the gauge determines the source rod depth automatically. In the *Manual* mode, the operator must enter the source rod depth manually.

After taking readings, lift the gauge from the test site by the source rod handle. This returns the source rod to the **SAFE** position. When not taking readings, always keep the source rod in the **SAFE** position.

After the measurement, the gauge displays the measurement results. To store the reading, press **<STORE>** (see below).

For soil (direct transmission) measurements, the density depth of measurement is the depth at which the source rod is placed (except for backscatter mode, which is approximately 4 in.). The moisture depth of measurement is determined by the moisture (or hydrogen) content of the material being tested. The following equations can be used to determine the approximate depth of measurement.

$$\text{Depth (inches)} = 11 - (0.17 \times M), \text{ where: } M = \text{moisture in } \text{pcf}$$

$$\text{Depth (mm)} = 280 - (0.27 \times M), \text{ where: } M = \text{moisture in } \text{kg/m}^3$$

## STORAGE FUNCTION

Assign a project number before storing readings by pressing **<PROJ>**. Select the desired option from the displayed menu. To store readings, press **<STORE>**. Follow the gauge prompts to enter any additional project information.

## Model 3430 Plus & 3440 Plus

### Surface Moisture-Density Gauge

### QUICK REFERENCE CARD



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## GAUGE START UP

### NOTE

The operator should wear a dosimeter or radiation badge when working with the Model 3430 Plus or 3440 Plus Surface Moisture-Density Gauge.

To turn on the gauge, press the power switch. Upon power-up, the gauge briefly displays the model number, software version, and serial number. It then performs a brief self-test, followed by a display test. Following the two tests, the gauge enters a 300-second warmup period, then displays the **Ready** screen:



### NOTE

The symbol  in the upper right of the display indicates that the GPS option is installed, the option is enabled, and the gauge is receiving GPS satellite signals. This option is available only on the Model 3440 Plus.

## GAUGE SETUP

### COUNT TIME

To change the current count time (length of measurement), press **<SETUP>** to display the **Setup** menu. Press **<1>** to access the *Count Time* function. Use the numeric keys to select the desired count time.

### SET UNITS

The gauge can display measurement results in either U.S. units (pcf) or metric (SI) units ( $\text{kg}/\text{m}^3$  or  $\text{g}/\text{cm}^3$ ). To select the units, press **<SETUP>** to display the **Setup** menu. Press **<2>** to display the **Units** menu. Select the new units using the corresponding number key.

### TARGET VALUES

To select or change a Marshall, Proctor, or voidless density value or Marshall and voidless density pairs, press **<TARGET>**. The gauge displays the **Target** menu. To edit a target value, press the number key that corresponds to that value. For example, to edit the Gmb (Marshall) value, press **<1>**.

The gauge displays the selected *Target Value* menu. The *Target Value* menu for the Proctor value is shown on page 3.

Gmb: ##.##	pcf
1: ##.##	2: ##.##
3: ##.##	4: ##.##
5: New	6: Disable

The menu shows the four stored target values (if any) and the *New* and *Disable* options. To select a stored target value, press the number key that matches the displayed target value.

To store a new target value, press **<5>**. At the prompt, use the number keys to enter the target value. Press **<ENTER/START>**. The gauge displays the value entered and asks if the operator wants to store the value. To store the value, press **<YES>**. The gauge can store the value in one of four *memory cells*. Storing a new value in a cell will erase the old value. At the **Select memory cell** prompt, use the number keys to store the value.

To disable the target value, press **<6>**.

## THE STANDARD COUNT

To compensate for the source decay and to check proper operation of the gauge, take a standard count each day that the gauge is used.

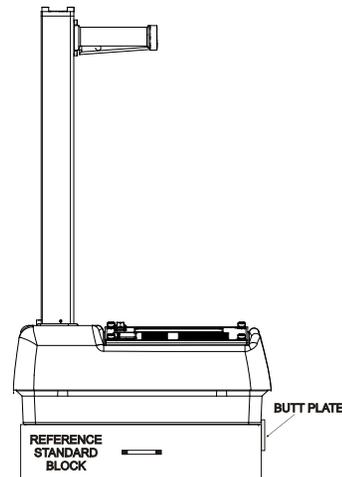
Place the reference standard block on a dry, flat surface of asphalt, concrete, or compacted soil at least 10 cm (4 in) thick. The location should be at least 3 m (10 ft) from any building or vertical structure and 10 m (33 ft) from any other nuclear gauge or radioactive source.

Ensure that the top surface of the reference standard block and bottom of the gauge are clean of debris. As shown at left, place the gauge between the grooves on the reference standard block. Place the source rod on your left and the right side of the gauge against the metal butt plate on the block.

### NOTE

Ensure that the source rod is in the standard (SAFE) position by firmly tapping down on the handle of the source rod.

Press **<STD>**. The gauge displays the last standard count. To take a new standard count, press **<YES>**. With the gauge in the standard count position, press **<ENTER/START>** to begin the standard count.



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After taking a 240-sec standard count, the gauge displays the density and moisture standards (*DS* and *MS*). The gauge also displays *P* or *F* to show if the results fall within acceptable limits. The *DS* should be within 1% and the *MS* should be within 2% of the previous four standard counts. Troxler recommends that the operator keep a daily log of the standard count results, using Appendix D of the Model 3430 and 3440 Plus *Manual of Operation and Instruction* (user manual).

## SITE PREPARATION

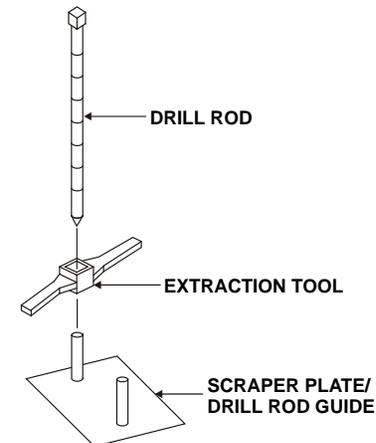
To ensure measurement accuracy, properly prepare the test site before taking gauge measurements.

### SOIL SITE

#### CAUTION

Safety glasses and a radiation dosimeter must be worn during this procedure.

Locate a smooth site on the soil free from any large holes, cracks, or debris. If necessary, smooth the surface by moving the scraper plate in a back and forth motion. Fill any voids or depressions with fine sand, ensuring that the total area filled does not exceed approximately 10 percent of the bottom area of the gauge. Strike off any excess fill. Place the scraper plate back on the surface and press down slightly to level the surface.



As shown at left, put the drill rod through the extraction tool and then through one of the guides on the scraper plate. Place the drill rod assembly on the test site. Step on the scraper plate. Hammer the drill rod at least 50 mm (2 in.) deeper than the desired test depth. The drill rod increments include the additional depth.

Mark the test area.

Remove the drill rod by pulling straight up on the drill rod extraction tool. **Do not loosen the drill rod by moving it from side-to-side.**

Place the gauge on the smoothed surface. Insert the source rod into the hole. Release the trigger in the gauge handle and lower the source rod to the correct depth. A *click* should be heard when the source rod is locked into position. Gently slide the gauge toward the keypad so the source rod touches the side of the hole.

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