

Basic Gauge Operation

Troxler Models 3400 Series and 4640-B Nuclear Density Gauges

The following is a basic guide to using Troxler's nuclear density gauges on typical compacted construction materials. Please refer to your operator's manual for more detailed information.

There are some basic parameters that need to be set in the gauge's memory. Please refer to the operator's manual for instructions on setting these in your specific model. They are as follows:

- **Count Time** – 1 minute or more is recommended for better precision
- **Set Units** – Metric or U.S. standard units
- **Depth** – Models 3440, 3440 Plus, 3450 and 3451 offer *Automatic* and *Manual* depth modes (automatic is recommended). Other models offer *Manual* mode (the operator sets the depth for each measurement).
- **Mode** – Models 3430 Plus, 3440, 3440 Plus, 3450 and 3451 offer *Soil* and *Asphalt* modes. Models 3450 and 3451 also offer a *Thin Layer* mode. Model 4640-B is a thin-layer gauge only. When using the Model 3430, set the target to *PR* for soil materials and *MA* for asphalt, concrete or other material where moisture is not of concern.

After turning the gauge on allow at least 10 minutes for the gauge to warm up. The standard count should be performed each day that the gauge is used to determine that the gauge is working properly and to adjust for source decay and environmental influences. Be sure that the gauge is positioned properly on the standard block that was supplied with the gauge. Please follow these guidelines:



1. Place the gauge on the white standard block with the keypad side (the side away from the source) against the metal plate (3400 series gauges).
2. The Model 4640-B should be placed on the air gap spacer with the source above the end with the two posts, and centered on the magnesium standard plate.



3. Place the standard block (plate) on a smooth, dry surface at least 10 ft (3 m) from any large vertical structure.
4. Be sure that any other nuclear sources are at least 33 ft (10 m) from the gauge during the standard count.
5. The material under the standard block should be compacted with a density of at least 100 pcf that is at least 4 in. (10 cm) thick. An asphalt or concrete surface is ideal.
6. Ensure that the handle is all the way up, and clicked into the **SAFE** position.

After the standard count (240 seconds), check the results on the display. The results should show ----.--%P for all counts. If using a Model 3430 or 3411, the operator must calculate the percentage of difference between the current standard and the average of the last 4 standard counts taken as explained in the operator's manual. Also check that the standard count is comparable to those shown on the calibration report from the most recent calibration. If there is a failing result (--.--%F), do not worry. First check to make sure that all of the guidelines listed above have been followed. If so and the failure is a small percent

(under 4%), accept the count and take another one. The result may fail again by a smaller percent; if so, accept it and keep going until it passes (must pass by the fifth count). If the standard count fails regularly, it may be necessary to perform a *stat test* as explained in the operator's manual. If the standard count fails by a larger percent (over 4% but under 10%) and all of the guidelines have been followed, perform a stat test. If this passes, perform a new standard count, accept the result, erase the previous counts (when using a Model 3440, 3450, or 4640-B), and perform four more. The fifth count must pass. If this happens frequently, please call a Troxler service or sales representative. If the count fails by more than 10% and all of the guidelines have been followed, call a Troxler service or sales representative. The calibration (reference) standard count value, as well as the projected standard counts, can be used to confirm if a questionable standard count is good or bad. Refer to the values from the most recent calibration report for your gauge.

Display Screens for Standard Counts

3430

```
Standard Count:
DS= ### MS= ###
```

Record the standard counts and calculate the %P or %F as compared to the previous 4 counts.
 For DS, $\pm 1\%$ variance is allowed;
 for MS, $\pm 2\%$ variance is allowed.

3430 Plus & 3440 Plus

```
DS= ##### #.#% P
MS= ##### #.#% P
Do You Want to
Use the New Std.?
```

For DS, $\pm 1\%$ variance is allowed;
 for MS, $\pm 2\%$ variance is allowed.

3440

```
MS=##### #.#.# %P
DS=##### #.#.# %P
Do you want to
use the new STD?
```

For DS, $\pm 1\%$ variance is allowed;
 for MS, $\pm 2\%$ variance is allowed.

3450

```
DS1=##### #.#%PASS
DS2=##### #.#%PASS
MS=##### #.#%PASS
Use New Standard?
```

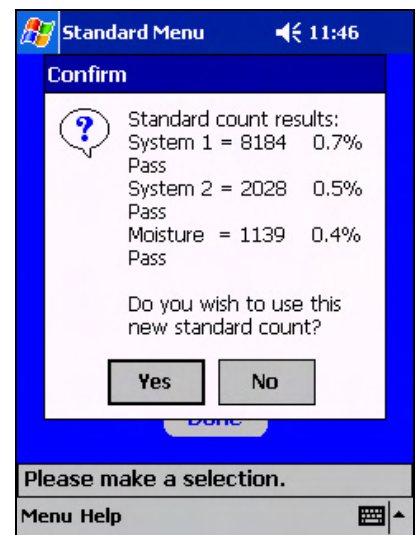
For DS1, $\pm 1\%$ variance is allowed;
 for DS2, $\pm 1.2\%$ variance is allowed;
 for MS, $\pm 2\%$ variance is allowed.

4640-B

```
Std 1 Std 2
#####
#.#.#%p #.#.#%p
Use new Stds ?
```

For DS1, $\pm 1\%$ variance is allowed;
 for DS2, $\pm 1.2\%$ variance is allowed.

3451



For System 1, $\pm 1\%$ variance is allowed; for System 2, $\pm 1.3\%$ variance is allowed; for Moisture, $\pm 2\%$ variance is allowed.

To perform a backscatter measurement:

(This is a surface measurement measuring from the surface to a depth of approximately 4 in. (10 cm) when not using a thin layer gauge.)

Locate a test site on the compacted material (soil, sand, aggregate, asphalt). This site should be as smooth as possible so no large voids are present under the gauge base. Place the gauge on the site and make sure that it doesn't "rock" or shift due to an uneven surface. Lower the handle to the first notch, being careful not to pass the proper position. (Press the trigger to release the handle, release the trigger and lower the handle until



it stops.) To begin the measurement, press **<START>**. At the end of the count the gauge will beep (except the Model 3411), pull up on the handle to place it in the **SAFE** position and check the display screen. For the best results, it is recommended to take three or four measurements at a site and find the average.

To perform a direct transmission measurement:

(The rod is lowered below the test material surface into a predrilled hole to measure a layer of compacted material up to 12 inches (30 cm) thick. The measurement is an average density of the material between the source and the detectors in the gauge base.)



Locate a smooth test site and place the scraper plate on the site. Place the extraction tool over the guide post and the drill rod in the guide post. Hammer the drill rod to the desired depth of measurement (the marks on the rod are in 2 inch (10cm) intervals), the rod should be driven to the bottom of the recently compacted layer of material or deeper, if possible.

Using the extraction tool, pull the drill rod straight up from the ground. Mark the corners or edges of the scraper plate so the gauge can be placed in the same "footprint". Lift the scraper plate and place the gauge in the outline just marked. Lower the handle to the desired depth. Make sure that the depth on the screen corresponds with the

depth of the source rod. When using the 3411 and 3430 it is the operator's responsibility to program the correct depth into the gauge either by the keypad (3430) or the depth knob (3411). After the count the gauge will beep (except 3411), pull up on the handle to place it in the "safe" position and check the display screen. For the best results, it is recommended to take 3 or 4 measurements at a site and find the average.

To perform a thin-layer measurement:

(Using a Model 4640-B, 3450, or 3451 gauge on asphalt or concrete materials.)

The procedure for a thin-layer measurement is the same as that for a backscatter measurement. When using a Model 3450 or 3451, ensure that the *Mode* is set to the *Thin Layer* option. Enter the appropriate lift (layer) thickness before taking measurements. Any thickness from 1 in. to 4 in. (2.5 cm to 10 cm) can be programmed into the gauge.

Please see the section titled "To perform a backscatter measurement."

To store measurement results:

(Except 3411 and 3430 gauges)

To store data for future viewing, printing or downloading, a project number must be created before testing begins. After the project is created or enabled, the **<STORE>** button is pressed after each measurement result is displayed. Please see your operator's manual for more detailed instructions.



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