

5.0 Scale Operations

The following paragraphs contain detailed operator instructions for the DC-100 counting scale (see Figure 5-1). Included are instructions to enter tare weights, toggle between net and gross weight, enter unit weights, perform inventory accumulation and reduction, and toggle between scales. All operator instructions are conducted with the scale in the operation mode that is the weighing or normal mode.



Figure 5-1. DC-100 Counting Scale

Counting scale accuracy is primarily determined by the following factors:

- Sample size (number of pieces)
- Total sample size as a percentage of full scale capacity
- Piece-to-piece weight variation

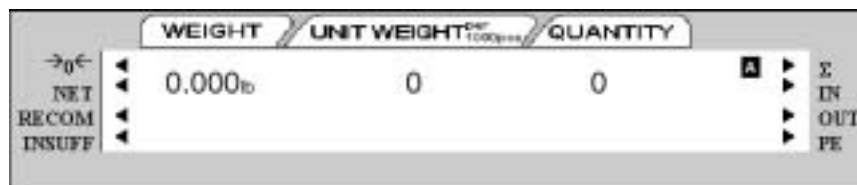
As a general rule when determining sample size of fairly uniform pieces, the larger the sample size the greater the total sample weight, therefore, the better the counting accuracy. Selecting the smallest capacity scale that can obtain the highest counting resolution should be considered, but should not sacrifice the capacity required for the heaviest container of parts. For this kind of application, a dual-platform scale may be the best selection.

There is a direct relationship between piece-to-piece weight variation (non-uniformity) and counting accuracy. Therefore, elimination of the piece-to-piece weight variations can be accomplished by:

1. Isolating the sample used to calculate the unit weight and use the same sample to re-check the scale.
2. Recalculating the unit weight from lot-to-lot of parts. Parts manufactured on one machine may vary slightly from another machine relative to weight.
3. Tightening the manufacturing tolerances on the parts reduces piece weight variations and increases count accuracy.

The Stand-By Screen

The starting point for using the scale in operation mode is the stand-by screen. At the stand-by screen the *WEIGHT*, *UNIT WEIGHT*, and *QUANTITY* displays show zeroes and the annunciator for the platform you are using is illuminated (A, B, C or D).



From the stand-by screen you can perform all of the basic weighing, counting and inventory operations of the scale.

5.1 Weight Unit Switching

Notes:

- *SPEC 600 SCALE UNIT SPECIFICATION* sets the default weight unit to Grams, Kgs or Lbs.
- *SPEC 642 WEIGHT/UNIT CONVERT* must be set to "0: YES" in order for you to be able to switch weight units during weighing operations.

The weight units displayed can be changed between Kg and Lb during weighing operations by pressing the LB/KG key.

5.2 Entering Tare Weights

Tare weights can be entered in the scale by one of two methods: one-touch tare or digital tare. Digital tare is used when the tare weight is already known while one-touch tare is used when the tare weight is unknown. If you call up an Item Code already programmed into the DC-100's memory and you have a Tare Weight stored for that Item Code, the Tare Weight stored with the Item Code will override one entered digitally or by using the TARE key.

Notes:

- *SPEC 621 DIGITAL TARE SETTING* must be a "1: ENABLE" to allow digital tare.
- *SPEC 620 TARE RANGE* must be set to the appropriate tare range value. Default is "0: 100 PERCENT OF FULL SCALE".

5.2.1 One-Touch Tare, Tare Unknown

1. If the tare weight value is not known, place the container, box, or item to be tared on the scale and press TARE. The weight display should now show 0 and the Net annunciator should illuminate.
2. Remove the container, box, or item from the scale. The weight display should show a negative weight value (weight of the tared container, box, or item).
3. To clear the tare weight, press TARE. The Net annunciator will no longer be illuminated.

5.2.2 Digital Tare, Tare Weight Known

1. If the tare weight value is known, use the numeric keypad to key in the value and then press TARE. The Net annunciator will illuminate.
2. To reset the tare to zero, press TARE again.

Note: For digital tare entry, the decimal must be in the appropriate place as it would be displayed in the weight display. For example, .250 would be entered as 0.250, not .250. The weight display shows weight entered with a negative sign indicating that it is a tare weight.

5.2.3 Tare Addition or Subtraction

Two tares can be accumulated or subtracted using the TARE key as well. Tare weights cannot be accumulated or subtracted by digital entry, although you can do tare exchange by digital entry (Section 5.2.4)

Notes:

- *SPEC 620 TARE RANGE must be set to the appropriate tare range value. Default is "0: 100 PERCENT OF FULL SCALE".*
- *SPEC 621 DIGITAL TARE SETTING must be set to "1: ENABLE" to allow digital tare*
- *SPEC 622 DIGITAL TARE ACCUMULATION must be set to "1: YES" to enable these functions.*
- *SPEC 623 DIGITAL TARE WHEN LOADED, SPEC 624 TARE SUBTRACTION FOR LOAD TARE ONLY, SPEC 625 TARE ADDITION FOR LOAD TARE ONLY, and SPEC 626 TARE VALUE EXCHANGE (FOR LOAD TARE) must all be set to 0:ALLOW or YES to enable these functions.*

Tare Value Addition or Subtraction by One Touch Tare

1. Place the container, box or item to be tared on the platform and press the TARE key. The weight display should now show 0 and the net annunciator will illuminate.
2. Place another tare weight on the platform and press the TARE key again. This will add the two tare weights together (Tare Addition).
3. Tare weights can be subtracted individually by removing one from the platform and pressing the TARE key again. To clear all the tare weights and return to the Operation Mode, remove all the tare weights and press the TARE key. The net annunciator will no longer be lit.

5.2.4 Tare Exchange

A tare weight that has been stored in the scale, either by digital entry or one-touch using the TARE key, can be changed during the operation mode. The new tare entered will overwrite the previous tare.

1. Remove any bin or container from the scale.
2. If the tare weight value is known, use the numeric keypad to key in the value and then press TARE. The weight display will now show the new tare as a negative number and the NET annunciator will illuminate.

If the tare weight value is not known, put the container to be tared out on the platter and press the TARE key. The new tare will be entered, the weight display will show 0.000 lb and the NET annunciator will illuminate.

5.3 Toggling Between Gross and Net

To toggle between net and gross weight, a tare value must be entered into the scale. Follow Section 5.2 to enter a tare value.

Note: *SPEC 643 GROSS MODE DISPLAY must be set to 0: YES (which is the default) to enable gross mode.*

After a tare value is entered into the scale, items placed on the scale will cause the net annunciator to illuminate and allow toggling between net weight and gross weight. An example of toggling between net weight and gross weight is shown below:

1. Place 0.5 lb weight on the scale and then press TARE once. The weight display should show 0.000 lb.
2. Place another 0.5 lb weight on the scale. The scale weight display should now show 0.500 and the net annunciator should be illuminated.
3. Press the NET/GROSS key. The weight display should show 1.000 GROSS WEIGHT, the net annunciator will no longer be illuminated. The unit weight and the quantity displays go blank.
4. Press the NET/GROSS key. The weight display should now show 0.500 and the net weight annunciator is illuminated again.

5.4 Entering Unit Weights

Entering unit weights can be done either by sampling, as presented in Section 5.4.1, or by key entry as described in Section 5.4.2.

Note: SPEC 03 EXTENT OF INSUFFICIENT SAMPLES controls unit weight sampling. The default setting for the SPEC is 0.1 percent.

Note: SPEC 63 SAMPLE QUANTITY determines the number of peices the scale assumes are on the platter when you press the PIECES key to calculate the unit weight. The default setting for the SPEC is 0: 10 peices.

Note: SPEC 64 SCALE A <-> B sets whether the unit weight determined by sampling is automatically transferred from Scale A to Scale B. The default setting for the SPEC is 0: MANUAL.

When you have a procedure that involves sampling an item's unit weight on the DC-100's built-in platform and then want to go immediately to weighing and counting boxes or bins on a floor scale or other external scale, set SPEC 64 to 1: AUTO. If the external Scale B is not necessarily going to be used for weighing the same item as is being sampled on Scale A, set SPEC 64 to 0: MANUAL.

Note: SPEC 65 UNIT OF PCS WT controls whether the unit weight is displayed per 1000 pieces or per 1 piece. The default settings for this SPEC is 0: 1000 pieces.

Unit Weight per 1000 Pieces vs. Unit Weight per 1 Piece

The scale's internal microprocessor calculates unit weights to 7 or 8 decimal places. However, the scale display generally can only show Unit Weight to 5 characters. If this Unit Weight is recorded from the scale display and entered by key entry, this can introduce errors in the Unit Weight and consequently in the counts. This error increases as the Unit Weight of the parts being counted decreases.

Example: A sample of 10 zener diodes is placed on the scale. The Unit Weight is computed to be 0.0006536 lbs. However, the scale has a 5 character display for Unit Weight so the scale can only display .0065 as the Unit Weight. If this Unit Weight were recorded and keyboard entered in future counting operations, the resulting error would be:

$$\frac{.00065}{.0006536} = .55\%$$

On the other hand, with entry of the Unit Weight as "weight per 1000 pieces" the decimal place is, in effect, moved three places to the right, allowing 3 more decimal places of accuracy. In this example, the entry would be made as 0.6536 per 1000 pieces, eliminating the error.

As a practical note, entering unit weights per 1000 pieces also lessens the chances of entering the wrong number of zeros when keying in weights with many leading zeros. Misentry of unit weights is a common cause of inaccurate counting.

When might you want to use unit weight per 1 piece? Generally in one of two cases:

1. If you are working with other existing systems or procedures that are already set up to record unit weight per piece (inventory systems, labeling requirements, etc).
2. If the unit weight or your pieces is more than 100 lbs, the number of digits in the scale's Quantity display will not be able to fully display counts of omore than 100 pieces.

5.4.1 Unit Weight Operation by Sampling

Unit weight operation by sampling is accomplished by placing a 10 piece sample on the scale and then pressing the PIECES key. The scale calculates a unit weight based on the capacity of the scale compared to the weight of the sample. The following paragraphs detail the procedure with SPEC 7 - UNIT WEIGHT AUTO-RECOMPUTING either set at 0 or 1.

SPEC 7 - Unit Weight Auto-Recomputing Set to "0: No" (Default)

1. Press REZERO to zero scale.
2. Place 10 pieces of the item to be sampled on the scale.
3. Press PIECES key. If the sample weight is sufficient (*INSUFF* annunciator is off), the display shows a unit weight for 10 pieces. However, if the weight of the sample is insufficient (*INSUFF* annunciator is on) the display will show ---ADD XX PIECES. Add the indicated number of pieces to the initial sample and then press the PIECES key again.

4. The display shows the total weight, unit weight and the quantity of the sample.

SPEC 7 - Unit Weight Auto-Recomputing Set to "1: Yes"

1. Press REZERO key to zero scale.
2. Place 10 pieces of the item to be sampled on the scale.
3. Press the PIECES key. If the weight of the sample is sufficient (*INSUFF* annunciator is off), the display shows a unit weight for 10 pieces. However, if the weight of the sample is insufficient (*INSUFF* annunciator is on) the display will show *---ADD XX PIECES*. Add the indicated number of pieces to the initial sample. The display then automatically recomputes the sample size and displays the unit weight and quantity of the sample.

5.4.2 Unit Weight Operation by Key Entry

Unit weight operation by key entry is accomplished by using the numeric keypad to enter the known value of the unit weight and then pressing the UNIT WEIGHT key. An example of unit weight operation by key entry is shown below:

1. With the display in the weighing mode, enter the known unit weight using the keyboard, for example, 200.00.
2. Press UNIT WEIGHT key to enter the unit weight.
3. Place a 2 lb. weight on the scale. The scale displays the quantity for the weight placed on the scale, for example, the weight display reads 2.000, the unit weight display reads 200.00, and the quantity display reads 10).

5.5 Part Accumulation and Negative Counting – Without Recalling an Item Code

The DC-100 counting scale is fully capable of part number inventory tracking and maintenance using the stored item code function internal to the scale software. See “Inventory Operations Related to the Item Code Quantity” on page 39. Additionally, the scale has the capability to acquire the total number of parts using the accumulation or reduction function of the scale (similar to the add/ subtract functions of a calculator).

5.5.1 Part Accumulation

To find the total accumulated quantity of similar containers filled with parts, use the accumulation procedure detailed below. This does not affect the inventory quantity for this item in the scale’s memory. To add or subtract from inventory, (see Section 6.2.5).

1. Conduct a sampling process (Section 5.4.1) to determine the unit weight of the pieces.
2. Enter known tare weight, or place the empty container on scale to perform tare function (Section 5.2).
3. Place Container 1 (full of parts) on the scale.
4. Press the **STATUS** key. The **IN** annunciator will illuminate, showing that you are now in accumulation mode.
5. Press the **+** key to store the total in Container 1. The memory annunciator **S** is now illuminated. The weight display briefly shows *total* and the quantity display shows the total pieces in the first container.

Note: If *SPEC 31 PC/PRN OUTPUT* is set to “2: BY +/-/PRINT KEY”, and you have an external printer connected, a label will be printed when you press the **+** key. If no external printer is connected, the error message “PAPER END” will appear, followed by the display of the total. The label will show the quantity in the container currently on the platform, not the accumulation. If *SPEC 14 AUTO EXIT FROM ADD MODE* is set to “0: NO”, the scale will not automatically exit from displaying the total amount. To return to the weighing mode, press the **CLEAR** key.

6. Remove Container 1 and place Container 2 (full of parts) on the scale.
7. Press the **+** key (total is equal to Container 1 plus Container 2, etc).
8. Continue with the remainder of the containers to be counted. The total number of parts stored in all the containers will be stored in the accumulation register.
9. To print a label in the default label format showing the total, press the *** REPRINT** key. This will also clear the accumulation register. The memory annunciator **S** is no longer illuminated.

5.5.2 Negative Counting

Just as you can count by adding parts to the scale, you can also count by removing parts from the scale. This is called “negative counting” because a negative weight is displayed while counting. Contrary to what may seem intuitively logical, you do not use the **(-)** key to do negative counting. The **(-)** key is only used to delete an entry in accumulation mode that you want to erase. This procedure does not affect the inventory quantity for this item stored in the scale. To reduce inventory, See “Inventory Operations Related to the Item Code Quantity” on page 39.

Note: To utilize the Negative Counting feature, *SPEC 2 - NEGATIVE COUNTING* must be set to “1: YES”.

There are two ways to do this depending on whether, at the end, you want to see the total amount remaining in the container or the total amount removed from the container.

Counting Out of a Full Container - See Total Amount Remaining in the Container

To carry out this operation you must know the tare weight ahead of time.

1. Place the full container on the scale. Press the **TARE** key.
2. Remove a 10 piece sample from the container and press the **PIECES** key. After the unit weight has been calculated, return the 10 piece sample to the container.
3. Remove a number of parts from the container and press the **+** key. The memory annunciator Σ annunciator is illuminated and the display shows the quantity of parts taken out.
4. Remove a number of parts from the container and press the **+** key again. The memory annunciator Σ will be illuminated and the display shows the quantity of parts removed.
5. If at the end of the procedure, if you want to see how many are still in the bin, you first have to know the tare weight of the bin or container. After removing the parts you want to take out of the bin, simply

digitally enter the tare weight of the bin and press the **TARE** key. The scale will display how many parts were left in the bin. To print a label to put on the bin showing the new, lower, total quantity in the bin, press the **+** key.

Note: If *SPEC 14 AUTO EXIT FROM ADD MODE* is set to "0: No", the scale will not auto exit from displaying the total amount. To return to the weighing mode, press the **CLEAR** key.

Negative Counting - Total Removed Displayed at the End

With this procedure you can count accurately out of a full container for kitting, shipping, etc. without having to know the tare weight of the container.

1. Place a full container on the scale and press **TARE**.
2. Remove a 10 piece sample from the container and press **PIECES**. After the unit weight has been calculated, return the 10 piece sample to the container.
3. Remove the number of pieces you need for kitting, shipping, etc. The amount removed will be displayed. If you need a label for each kit or container, press the **+** key after removing each batch of pieces. Then press the **TARE** key.
4. When you have removed the last batch of pieces, press the ***** **REPRINT** key to show the total number of pieces you have counted out of the full container.

5.5.3 Clearing Accumulated Data

To clear accumulated data, press the ***** **REPRINT** key.

5.6 Toggle Between Scales

To toggle between Scales A through D, press the **SCALE** key. The indicator lamp for the appropriate scale lights on the display.

Pressing the **SCALE** key rotates the scales available for selection as follows:



Only scales present will be selected (i.e. A two-scale system switches between Scale A and Scale B only.) If no external scales are connected, this function will not work.