

**Determining Balance Weight & Friction Weight
Components of Down Weight and Up Weight**

Balance Weight is defined as the amount of weight placed on the front measuring point of the key that causes the key to be statically balanced in a motionless state. It is found by determining the point half way between Down Weight and Up Weight. Friction Weight is defined as the number of grams added to the Balance Weight to produce the Down Weight motion or subtracted from the Balance Weight to produce the Up Weight motion. (Friction is assumed equal in both directions)

Down Weights and Up Weights are measured in grams, with the action well bedded on the bench. To take the measurements place gram weights on the front of the key centered on the standard measuring point which is defined as 1/2" or 13mm back from the front edge of the top surface of the key.

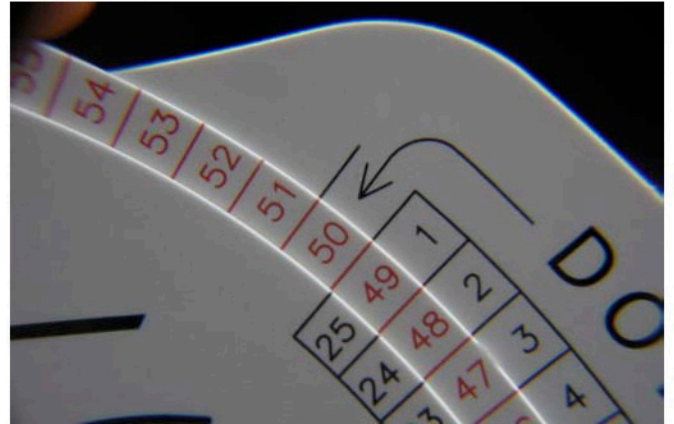
To measure Down Weight: find the gram weight that causes the hammer to rise up to let-off in a controlled motion (not accelerating) with two or three soft thumps on the bench or action stack.

Up Weight is measured in a similar, but reverse, sequence: Find the gram weight that causes the hammer of the depressed key to drop in a controlled motion to a point where, with two or three soft raps or thumps on the bench or action stack, the hammer comes back to the rest. Important to note that the key is depressed only to the point where initial contact is made by the jack and/or drop screw without deflecting their springs.

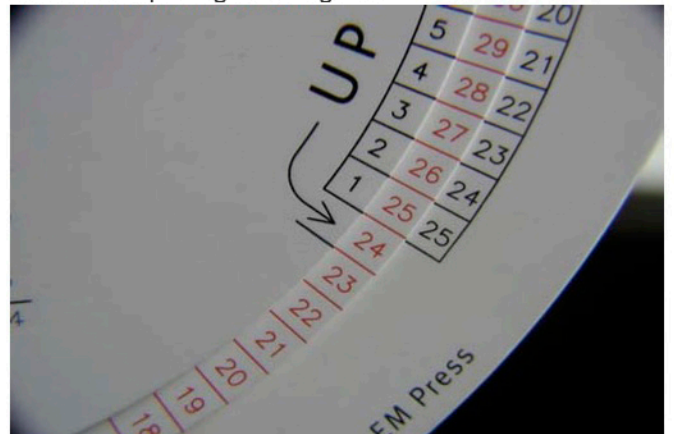
To determine Balance Weight and Friction Weight, values, rotate the red gram scale disc so the Down Weight zero point arrow is set to the measured Down Weight. Hold together the Down Weight and the gram scale discs. Rotate Up Weight disc so the zero point arrow is set to the measured Up Weight. The Friction Weight is indicated by the point where the Up and the Down Weight friction scale values match side by side. The Balance Weight is indicated in between those values on the red scale. In the example shown to the right.

The Friction Weight for a 50/24 example is 13 grams.
The Balance Weight is 37 grams.

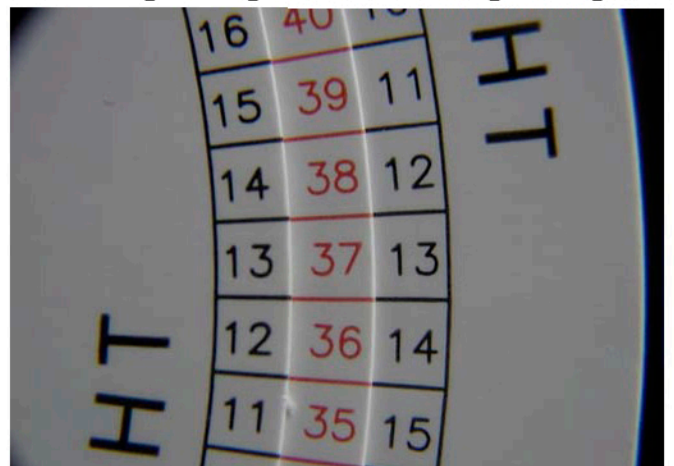
Example with 50 gram Down Weight - 24 Gram Up Weight
Dial in the Down Weight to 50 grams



Dial in the Up Weight to 24 grams



Friction Weight is 13 grams - Balance Weight is 37 grams



Odd/Even – Even/Odd Up/Down Weights

In cases where Up Weight & Down Weight are both odd or even, the resulting balance weight and friction weight will be an even whole number. If Up Weight and Down Weight are odd/even the resulting balance weight and friction weight will be a half number. In these cases look for diagonally matching numbers on the friction scales. Take the example pictured of a 50 Down Weight with a 23 Up Weight. The Friction Weight is 13.5 grams and Balance Weight is 36.5 grams

Managing Friction Weight

A Friction Weight Rating Table is provided on the front of the calculator. Compare the note number to the friction weight and rate friction as low, medium, or high. High zone friction weights are not recommended. Medium or Low zone friction weights are acceptable so long as there is consistency from note to note. Excessively low Friction Weights are associated with actions that feel "Slippery" and difficult to control, especially in the pianissimo ranges. Note that friction weight zones are higher in the bass than in the treble due to higher hammer weight in the bass compared to the treble.

Key Bushing friction is the most common and fixable source of friction. To isolate and measure key bushing Friction Weight, remove the action stack, then place key levelling weights on the back of the keys. Measure Down Weight and Up Weight and determine the Key Stick Friction Weight. 1g-2g with no side play is ideal. If keys are eased but Friction Weight with the stack on is high, look for overly tight Hammer Flange Frictions, Wippen Flange Friction has less influence but still work checking.

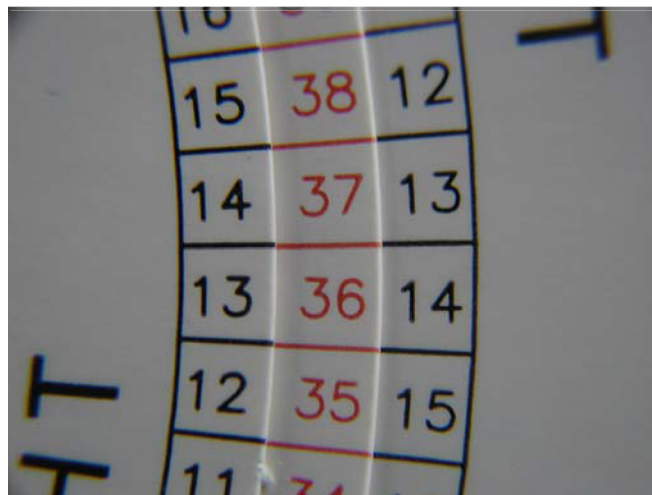
Stanwood New Action Protocol – Quick Method

Smoothly scaled Key Front Weights combined with smoothly scaled Hammer Strike Weights that yield an average Balance Weight level gives a high standard of quality with predictable Inertial Playing Quality and the least amount of work with no complicated calculations. For example: Choose a medium Key Front Weight reference scale #7 and weigh off the keys. Mock up a couple of natural notes in the center of the piano and determine what Hammer Strike Weight yields a medium 38g Balance Weight. Choose the closest Hammer Strike Weight reference scale and weigh off the hammers. With smooth hammer and key weights the Balance Weight will vary +-2 grams which is acceptable.

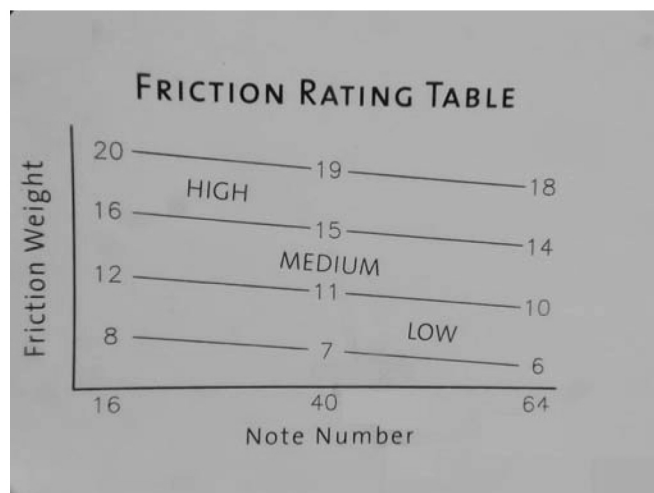
StrikeWt and FrontWt scales available at:

stanwoodpiano.com/touchweight.htm
Go to PTG Journal Articles by David Stanwood
Go to PTJournal October 23, 2023

With a Down/Up of 50/23 find the diagonal matched pair. Here the Friction Weight is 13.5 and the Balance Weight is 36.5



If Note 40 has a 13.5 Friction Weight it is rated as "MEDIUM"



Want to know more?

Stanwood Piano Innovations Inc. maintains a free web link for piano technicians at www.stanwoodpiano.com. The site contains useful reference information including hammer weight standards and rating tables as well as a list of publications with more detailed information about touch weight. Please feel free to call or contact Stanwood Piano Innovations Inc. if you have any touch weight related questions. Check the URL from time to time for new information.

Stanwood Piano Innovations also provides 2-6 day training courses for experienced piano technicians who want to become licensed installers of Precision Touch Designs™ or PTD. The course provides basic knowledge and techniques for analyzing and optimizing weight, leverage, friction, and geometry characteristics in piano actions. PTD is used in conjunction with high quality regulation, tuning, and voicing to create pianos that feel, sound, and play more smoothly, more comfortably, and with a wider range of tone than has ever been possible before. Be the best... use PTD in your work... For more information on becoming a PTD installer, contact:

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