



## Strength Assessment

### Variables

There are four variables which must be controlled when using the DYN0 for assessing strength:

1. Load. \*
2. Range of movement.
3. Number of repetitions.
4. Time between repetitions.

\* The "load" is the coefficient of air resistance calculated by the monitor. It is controlled by opening and closing the flywheel dampers. The more flywheel dampers there are open the heavier the "load" will be. Opening more dampers on the DYN0 is similar to increasing the damper setting on the Indoor Rower.

### Critical Steps

To obtain repeatable and comparable results when using the DYN0 for assessing strength the following steps must be taken:

1. Set the load by opening a specific number of consecutive flywheel dampers.
2. Specify the number of repetitions to be completed. The monitor only counts up, so you have to tell the subject how many repetitions to complete.
3. Record the individual and average force of the repetitions.
4. The time between the repetitions must be specified and controlled.
5. The range of movement for each exercise must be specified and controlled.

### Dynamic Test Protocols

The following instructions are example test protocols. The numbers in bold can be varied to suit the requirements of the test.

#### Seated Bench Press

1. Set the load by opening **four** consecutive flywheel dampers and leaving **four** closed. Record the load (this is the fifth display option on the monitor).
2. Adjust the handle to the height of the candidates sternum.
3. Reset the monitor using the "I/O" button to show "start in 3 rep".
4. Start each "lift" with the push bar in contact with the candidates chest and finish when the arms are fully extended.
5. The three warm-up "lifts" can be done at the candidates preferred intensity.

6. The candidate should then perform **five** maximum “lifts” with exactly **three** seconds of recovery, shown in the bottom right of the monitor, between efforts.
7. Record the force for each of the **five** measured “lifts” and the set average. This will appear in the central display ten seconds after the **fifth** lift.

### **Seated Bench Pull**

1. Set the load by opening **four** consecutive flywheel dampers and leaving **four** closed. Record the load (this is the fifth display option on the monitor).
2. The candidate sits with their chest against the support and feet flat on the ground. The handle remains at the height set for the Bench Press test.
3. Reset the monitor using the “I/O” button to show “start in 3 rep”.
4. Start each “lift” with fully extended arms and finish when the handles pass the chest support and the hands touch the chest.
5. The three warm-up “lifts” can be done at the candidates preferred intensity.
6. The candidate should then perform **five** maximum “lifts” with exactly **three** seconds of recovery, shown in the bottom right of the monitor, between efforts.
7. Record the force for each of the **five** measured “lifts” and the set average. This will appear in the central display ten seconds after the **fifth** lift.

### **Leg Press**

1. Set the load by opening **four** consecutive flywheel dampers and leaving **four** closed. Record the load (this is the fifth display option on the monitor).
2. Sit the candidate to the rear of the seat, leaning the body forward slightly and holding the handles under the seat.
3. Reset the monitor using the “I/O” button to show “start in 3 rep”.
4. Start each “lift” with vertical shins and finish with the legs fully extended.
5. The three warm-up “lifts” can be done at the candidates preferred intensity.
6. The candidate should then perform **five** maximum “lifts” with exactly **three** seconds of recovery, shown in the bottom right of the monitor, between efforts.
7. Record the force for each of the **five** measured “lifts” and the set average. This will appear in the central display ten seconds after the **fifth** lift.

### **Statement of Accuracy**

The DYNO monitor measures the acceleration, speed of rotation and moment of inertia of the flywheel (the moment of inertia is calibrated at the factory to within 0.5%). This data is used to calculate the readings displayed.

The DYNO was physically tested for repeatability by securing it to a wall so that the monorail was vertical. A weight was attached to the carriage. When the carriage was released the weight would act as the force for each "lift". Repeated cycles with a given number of dampers open yielded a variation of less than 1% in the force readout of the monitor.

However, the test did reveal a problem when all eight dampers were open (the heaviest, slowest setting). Under these circumstances the drag factor was occasionally grossly miscalculated. This caused the monitor to calculate incorrect force readings. Concept 2 are currently working on a solution to this problem. Until it has been fixed, testing should not be carried out with more than six dampers open.

### **Unmeasured Friction**

The monitor only senses the force applied to the flywheel. Frictional losses in the drive system between the user and the flywheel are not measured. Tests have shown that the force required to overcome the friction in the system is approximately 2 kg.