

Concept2 Indoor Rower Fact Sheet 1:

Damper Lever, Drag Factor And The Speed Strap

Setting up the Concept2 Indoor Rower - Damper lever, drag factor and the Speed Strap

One of the most misunderstood features of the Concept2 Indoor Rower is the definition and use of **drag factor**. The most probable reason for this is the complexity of the **drag factor** calculation and how the data is provided to the Performance Monitor display.

This Fact Sheet defines and describes **drag factor**, explains how to set the correct **damper lever** and **drag factor** level to ensure a safe and effective workout, and sets out the optimum **drag factor** range for children and adults.

- **What is Drag Factor?**

Drag Factor is a numerical value for the rate at which the flywheel is decelerating.

To display **drag factor** on a PM3/PM4 choose **More Options** from the Main Menu then **Display Drag Factor**.

- **Damper lever setting**

The **damper lever** is on the side of the fan cage, is numbered 1 to 10 and controls the **drag factor**. With the damper lever set to level 10 more air can pass across the fan **increasing** the resistance (**drag**) on the flywheel and at setting 1 less air passes across the fan **decreasing** the resistance (**drag**) on the flywheel.

- **Recommended drag factor settings for children in Year Groups 7 to 10 and for adults**

The monitor displays the **drag factor** as a number in the order of 100 at level 1 and around 220 at level 10 on a new machine. For adults a **damper lever** setting of 2-5 for the best aerobic workout is recommended with a **drag factor** range of 115-140. For children the **damper lever** setting is 1-3 with a **drag factor** range of <100 to 125 (Year 7 – Year 10).

Why it is important to understand drag factor?

Using the correct **drag factor** focuses the activity of indoor rowing on developing good technique, improved agility and coordination skills and ensures the optimum biomechanical and physiological response. Good rowing technique is about speed of application of power and not just brute strength.

Rowing with the **drag factor** too high will be detrimental to a workout and will increase the risk of injury. Therefore understanding of the correct **drag factor** setting is a significant health and safety issue.

What is Drag Factor?

“Drag Factor” is a numerical value for the rate at which the flywheel is decelerating. This number changes with the volume of air that passes through the flywheel housing. Since higher damper settings allow more air into the flywheel housing, the flywheel decelerates more quickly, resulting in a higher Drag Factor value. The electronic Performance Monitor measures the Drag Factor on the recovery phase of each stroke and uses it to calculate your score. This method of “self-calibration” compensates for local conditions and damper settings, making scores on different Indoor Rowers comparable. Indoor racing and the Online Community are made possible by this method of self-calibration.”

The load on the Concept 2 Indoor Rower is unlike any normal resistance training equipment. There is no pre-set load; what is measured is the ability of the user to accelerate the flywheel overcoming the air resistance forces opposing the flywheel rotation.

The **damper lever** is on the side of the fan cage, is numbered 1 to 10 and controls the **drag factor**. With the damper lever set to level 10 more air can pass across the fan **increasing** the resistance (**drag**) on the flywheel and at setting 1 less air passes across the fan **decreasing** the resistance (**drag**) on the flywheel.

The **Gears on a Bike** analogy is very useful tool for explaining the relationship between the **drag factor**, the level of resistance and the calculated values for power and pace. The same amount of power will produce the same speed / pace whether it is applied when using a high gear / **drag factor** or when a lower setting is employed. In the case of a high gear / **drag factor** the power will be applied through a slower movement working against a higher load. Conversely in the case of a lower gear / **drag factor** the power is applied more quickly working against a lighter load.

Key Point 1: The damper level setting is not an indication of how fast the user can go - level 10 is not fast and level 1 is not slow.

Key Point 2: Drag is not a measure of how difficult it is to complete a workout. A damper setting of level 10 is not more difficult than an equivalent setting of 1. It is important to note that, unlike weight lifting or many types of CV equipment the goal on an Indoor Rower is not to use a higher **damper lever** or **drag factor** setting as a means of achieving fitness.

Key Point 3: The Performance Monitor detects any **increase** or **decrease** in the **drag factor** and compensates for the difference by calculating fair equivalent values for the power and pace before displaying them on the screen. The monitor detects the effect on the flywheel not the position of the **damper lever** so although the damper lever setting on different machines may not be the same the **drag factor** reading will always be correct.

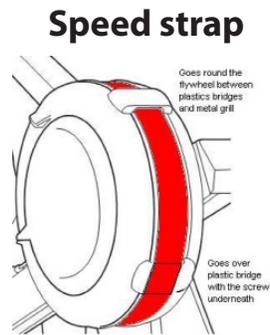
As a result the only means of measuring the intensity of a **Stroke** is by reading the **Power (Watts)** or **Pace** (mins:secs per 500 m) displayed on the screen regardless of the **drag factor** or damper setting (see **Fact Sheet 3 Force Curve, Power (Watts), Pace and Stroke Rate**).

Key Point 4: The harder a user rows the more resistance is felt. This is because the Concept2 Indoor Rower uses air resistance, which is generated by the spinning flywheel. The greater the increase made to the flywheel speed, the more resistance there will be.

Key Point 5: The longer the period of the recovery in between strokes the greater the deceleration of the flywheel. The slower the flywheel is moving the greater the acceleration required to achieve a given pace. This means that for a given pace more resistance will be generated at lower stroke rates.

Key Point 6: If the perforations on the fan cage become clogged or the ambient conditions change (pressure, temperature, humidity, flow of surrounding air) or the machine is next to surrounding objects the damper lever will need to be put on a higher/lower setting to achieve the same **drag factor**.

Key Point 7: For children, it is particularly important to set the **drag factor** at the correct, safe level. The **drag factor** can be lowered using a **speed strap** (the **speed strap** is a length of webbing which straps round the fan casing on the Concept2 indoor rowing machine to reduce the **drag factor**).



For younger users, use of a speed strap is a good way to build technical ability. This is because the strap gives the best biomechanical and physiological set up for youngsters and rewards better technique.

What is the correct drag factor setting?

With a little experimentation, the correct **drag factor** setting that gives the best workout and results can be found. Once the ideal set up has been established the **drag factor** rather than the **damper lever** setting should be noted, as this will remain constant across different machines.

The monitor displays the **drag factor** as a number in the order of 100 at level 1 and around 220 at level 10 on a new machine. For adults a **damper lever** setting of 2-5 for the best aerobic workout is recommended with a **drag factor** range of 115-140. For children the **damper lever** setting is 1-3 with a **drag factor** range of <100 to 125 (Year 7 – Year 10).

On-water rowers use the machine with a **drag factor** range of 125 to 140 or **damper level** 3 to 5. The reason for this is that at this level the feel is closest to that of a racing boat which makes the training rowing specific.

The effective range of **drag factor** settings on an indoor rower is narrow. Always set the **drag factor** at the same level for every session. As a general guide **drag factor** should be set in the following range:

Children

- Year 7 - below 100 to 100 (girls & boys) (use the speed strap to go below 100)
- Year 8 - 100 (girls) 110 (boys)
- Year 9 - 105 (girls) 115 (boys)
- Year 10 - 110-115 (girls) 120-125 (boys)

Adults

- Male heavyweight (over 75 kg) - 125-140
- Male lightweight (under 75 kg) - 120-135
- Female heavyweight (over 61.5 kg) - 120-130
- Female lightweight (under 61.5 kg) - 115-125

How do you set drag factor on the Performance Monitor?

To display **drag factor** on a PM3/PM4 choose **More Options** from the Main Menu then **Display Drag Factor**. Row for a few seconds - **drag factor** is displayed – adjust the damper level until the correct **drag factor** is shown – return to the **Main Menu**.