www.innervations.com

C-Force

Performance Force Platform

*Purpose designed to be highly portable
*Symmetry analysis with a single platform

Text

Innervations has designed and created a new performance force platform based on over 38 years of athlete performance diagnosis.

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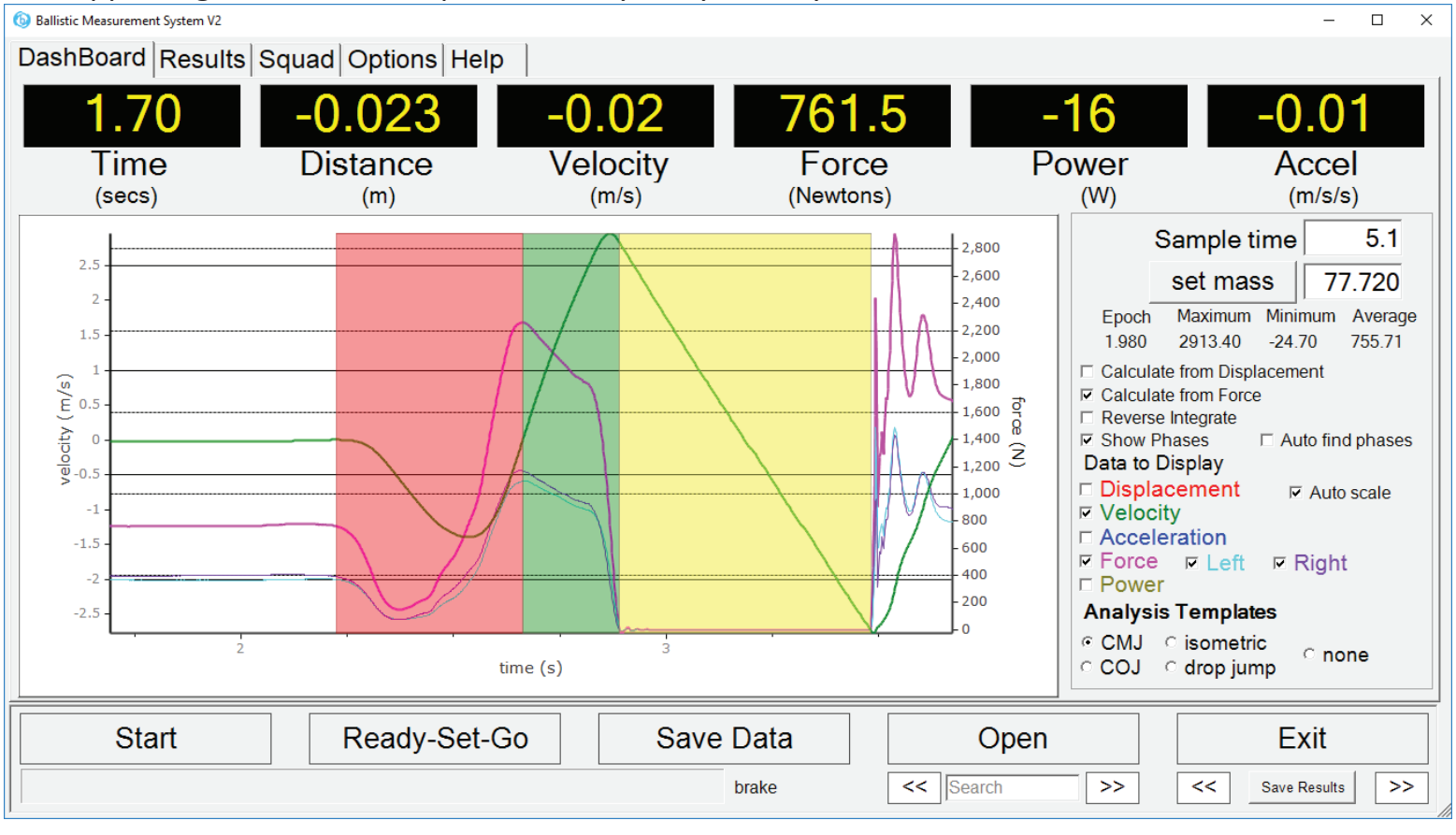
Force Performance

We asked strength and conditioning coaches and sports scientists throughout the world what they wanted in a force platform for athlete testing and training.

- Lighter and more portable - built for travel
- Faster sample rate and higher resolution
- Not reliant on mains power, no batteries to recharge or go flat
- Large enough to test tall athletes
- Capable of a wide range of tests - not just total force measurement
- Interfaced with Windows or Mac computers for full computer processing power
- No smart phones and tablets or reliance on Internet

The result is the C-Force Performance Platform, built in carbon fiber to be faster, stronger, lighter and specifically designed to outperform all other instruments on the market.

- 700mm x 500m x 50mm platform dimensions
- Up to 10,000 per second (Hz) sampling frequency on all four force channels
- Powered entirely from USB connection to computer
- Constructed entirely from carbon fiber apart from load cells, cables and USB interface
- Maximum force measurement of 9,800 N (1000 kg mass equivalent)
- Can be configured with dual platforms for simultaneous left and right data collection
- 4 independent force channels for symmetry, balance and stability analysis with a single platform
- Less than 10kg mass
- 18 bit AtoD for resolution of 0.04 N (0.003 kg or 3 gm mass equivalent)
- Includes latest Ballistic Measurement System Version 2 software
- Supporting dual screens, rapid trial analysis, symmetry assessment, and real time feedback



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Technical Note

Updated 15th June 2021

InnerBalance – Parameter Calculations – Balance Analysis

The measurement parameters calculated by the InnerBalance software apply to the currently selected section of data or the entire dataset if no subset has been selected.

Parameter	Description
Duration of trial (seconds)	Time period between the start and the end of the currently selected section of data or the entire dataset if no subset has been selected.
Total distance (metres)	Total distance travelled as a path of the centre of pressure.
Average velocity (m/s)	Average velocity of the centre of pressure.
Peak velocity (m/s)	Highest velocity of the centre of pressure.
Total sway (degrees)	Summed angular displacement of the centre of mass.
Average sway velocity (deg/s)	Average velocity of sway angle calculated as total sway divided by duration.
Peak sway velocity (deg/s)	Highest velocity of sway angle.
Mediolateral (ML) total distance (m)	Length of the path of the centre of pressure in the mediolateral (left to right) plane.
Anteroposterior (AP) total distance (m)	Length of the path of the centre of pressure in the anteroposterior (front to back) plane.
Mediolateral (ML) average velocity (m/s)	Average velocity of the path of the centre of pressure in the mediolateral (left to right) plane calculated as ML total distance divided by duration.
Mediolateral (ML) peak velocity (m/s)	Highest velocity of the path of the centre of pressure in the mediolateral (left to right) plane.
Anteroposterior (AP) average velocity (m/s)	Average velocity of the path of the centre of pressure in the anteroposterior (front to back) plane calculated as AP total distance divided by duration.
Anteroposterior (AP) peak velocity (m/s)	Highest velocity of the path of the centre of pressure in the anteroposterior (front to back) plane.
Mediolateral (ML) range (cm)	Difference between the highest ML value and lowest ML value. That is most right minus most left COP measure.
Anteroposterior (AP) range (cm)	Difference between the highest AP value and lowest AP value. That is most forward minus most backward COP measure.
Total excursion area (cm^2)	ML range multiplied by AP range.

Technical Note

Updated 11th January 2021

Ballistic Measurement System – Parameter Calculations

The measurement parameters calculated by the BMS software apply to the currently selected section of data or the entire dataset if no subset has been selected.

Peak Force - highest single force sample within the whole data set or selected subset.

Peak Force/mass - Peak force divided by measured mass. Note measured mass is the actual mass on the forceplate during the test including any additional load such as the barbell. It is not the body mass of the athlete recorded in the squad file.

Mean Force - average of all of the force samples of the whole data set or selected window.

Mean Force/mass - Mean force divided by measured mass. Note measured mass is the actual mass on the forceplate during the test including any additional load such as the barbell. It is not the body mass of the athlete recorded in the squad file.

Peak Power - highest power calculated as a single sample of the force data that is largest.

Peak Power/mass - Peak power divided by measured mass. Note measured mass is the actual mass on the forceplate during the test including any additional load such as the barbell. It is not the body mass of the athlete recorded in the squad file.

Mean Power - average of all of the power samples of the whole data set or selected window.

Mean Power/mass – Mean power divided by measured mass. Note measured mass is the actual mass on the forceplate during the test including any additional load such as the barbell. It is not the body mass of the athlete recorded in the squad file.

Peak Velocity - highest velocity calculated as a single sample of the velocity data that is largest.

Minimum Velocity - lowest velocity calculated as the single sample of the velocity data that is smallest. Note – when CMJ, COJ or DJ template is selected minimum velocity is calculated as lowest velocity prior to takeoff.

Peak Displacement - highest displacement calculated as the single sample of the displacement data that is largest.

Minimum Displacement - lowest displacement calculated as the single sample of the displacement data that is smallest.

Unloading Force - minimum force recorded during the eccentric phase.

Force@Ecc2Con - force at the transition from eccentric to concentric which is the zero crossing of the velocity data.

Force@Peak Power - force corresponding to the same sample number (time) of the peak power.

Velocity@Peak Power - velocity corresponding to the same sample number (time) of the peak power.

Power@Peak Force – power corresponding to the same sample number (time) of the peak force.

Velocity@Peak Force - velocity corresponding to the same sample number (time) of the peak force.

Jump Height Derived From Flight Time - jump height calculated from the flight time using the equation: $d = gt^2 / 8$

Where: d = jump height

g = 9.81 m/s/s

t = flight time

Jump Height Derived From Peak Velocity - jump height calculated from the peak velocity using the equation: $d = v^2 / 2g$

Where: d = jump height

v = peak velocity

g = 9.81 m/s/s

Max RFD – Rate of Force Development (RFD) as the largest positive change in force over any 30 ms Epoch.

RFD 30ms – RFD over the initial 30 ms from the start of the concentric phase.

RFD 90ms - RFD over the initial 90 ms from the start of the concentric phase.

RFD 150ms - RFD over the initial 150 ms from the start of the concentric phase.

RFD 200ms - RFD over the initial 200 ms from the start of the concentric phase.

RFD 250ms - RFD over the initial 250 ms from the start of the concentric phase.

Avg Ecc RFD - change in force from the minimum (unloading force) to the force at the end of the eccentric phase divided by the time between these two points.

Avg Conc RFD – difference between force at the start of the concentric phase and peak force during the concentric phase divided by the time between the two points.

Total Impulse - area under the force time curve calculated as the sum of each force sample multiplied by the period between samples which is the inverse of the sample frequency.

Impulse 0-100 ms - total impulse for the first 100 ms from the start of the selected dataset. Note: for CMJ, COJ, DJ and Isometric templates impulse is calculated from start of the concentric phase.

Impulse 0-200 ms - total impulse for the first 200 ms from the start of the selected dataset. Note: for CMJ, COJ, DJ and Isometric templates impulse is calculated from start of the concentric phase.

Impulse 0-250 ms - total impulse for the first 250 ms from the start of the selected dataset. Note: for CMJ, COJ, DJ and Isometric templates impulse is calculated from start of the concentric phase.

Impulse 0-300 ms - total impulse for the first 300 ms from the start of the selected dataset. Note: for CMJ, COJ, DJ and Isometric templates impulse is calculated from start of the concentric phase.

Total Eccentric Impulse - total impulse (summed force x time) over the eccentric phase. That is from the start of the eccentric to the zero crossing of velocity from negative to positive.

Total Concentric Impulse - total impulse (summed force x time) over the concentric phase. That is from the start of the concentric phase to the point of takeoff.

Tm to Pk Fc - Time to peak force measured as the period between the start of the selected dataset and the time at which peak force occurs. Note: for CMJ, COJ, DJ and Isometric templates time is calculated from start of the concentric phase.

RPD - rate of power development calculated as the peak power divided by the time to peak power.

Tm to Pk Pw - Time to peak power measured as the period between the start of the selected dataset and the time at which peak power occurs. Note: for CMJ, COJ, DJ and Isometric templates time is calculated from start of the concentric phase.

Start of Eccentric – if force is recorded start of the eccentric phase for CMJ and DJ is defined as the sample or time point at which the force drops below the measured body weight.

Start of Concentric - start of the concentric phase is defined for CMJ and DJ as the sample or time point of the transition from eccentric to concentric which is the zero crossing of the velocity data.

Takeoff - sample or time point at which the force drops below the force threshold set under options. By default this is 20N.

Landing - sample or time point at which the force rises the force threshold set under options. By default this is 20N.

Eccentric Time - time period between the start of eccentric phase and the start of the concentric phase.

Concentric Time - time period between the start of the concentric phase and takeoff.

Ecc+Con Time – sum of the eccentric time plus the concentric time.

Contraction Time - equal to the sum of eccentric time plus the concentric time (Ecc+Con Time).

Flight:Contract - flight to contraction ratio is calculated as flight time divided by contraction time. This is equivalent to reactive strength index (RSI).

Unload Force – minimum force during the countermovement.

Unload force time – time at which the unload force occurs.

Unloading time – difference between the time of minimum force (unload force time) and the start of the eccentric phase.

Unloading RFD – difference between the force at the start of the eccentric phase and the unloading force divided by the unloading time.

Yielding time – difference between the time of minimum force (unload force time) and the time of minimum velocity.

Yielding RFD – difference between the force at the time of minimum velocity and the unloading force divided by the yielding time.

Braking time – difference between the time of the end of the eccentric phase (zero crossing from negative to positive velocity) and the time of minimum velocity.

Braking RFD – difference between the force at the end of the eccentric phase and the force at minimum velocity divided by the braking time.

Force@100ms – force at 100ms from the start of the concentric phase.

Force@200ms – force at 200ms from the start of the concentric phase.

%Fmax@100ms – force at 100ms from the start of the concentric phase as a percentage of the peak concentric force.

%Fmax@200ms – force at 200ms from the start of the concentric phase as a percentage of the peak concentric force.

Symmetry Measures

Peak Force – left side force at peak force divided by right side force at peak force.

Minimum Force – left side force at minimum force divided by right side force at minimum force.

Concentric Impulse – total impulse on the left side during the concentric phase divided by total impulse on the right side during the concentric phase.

Eccentric Impulse – total impulse on the left side during the eccentric phase divided by total impulse on the right side during the eccentric phase.

Force at transition –left side force at the transition from eccentric to concentric divided by right side force at the transition from eccentric to concentric.

รายละเอียดและคุณลักษณะ
ชุดอุปกรณ์แผ่นวัดความสามารถในการออกแรง ของนักกีฬา
(C – Force Performance Platform)

1. วัตถุประสงค์การใช้งาน

เป็นชุดอุปกรณ์สำหรับวิเคราะห์ประสิทธิภาพในการออกแรง ซึ่งสามารถคำนวณข้อมูล ค่าแรง (Force) ค่าพลัง (Power) ค่าความเร็ว (Velocity) ค่าความเร่ง (Acceleration) ระยะทางในการเคลื่อนที่แนวดิ่ง (Displacement) ค่าอัตราการพัฒนาแรง (RFD) เพื่อใช้ในการประเมินผลการฝึกซ้อมหรือการฟื้นฟูได้อย่างเหมาะสม

2. คุณลักษณะเฉพาะ

2.1 สามารถทดสอบการออกแรงได้หลายรูปแบบ

- countermovement jump, concentric only (squat) jump, depth jump
- weightlifting movements e.g. snatch, high pull, clean
- single leg hops and landings
- land and hold – single and double leg
- isometric mid-thigh pull, squat, posterior chain, shoulders
- upper body ballistic e.g. pushup, shoulder press
- และอื่นๆ

2.2 ทำด้วยวัสดุ คาร์บอนไฟเบอร์ (Carbon fiber) มีขนาด 700mm x 500m x 50mm

2.3 ความเร็วในการส่งถ่ายข้อมูล 10,000 Hz ต่อวินาที

2.4 มีความแม่นยำ ที่ความละเอียด 18 bit

2.5 มีโหลดเซลล์แยกทั้ง 4 มุม

2.6 ใช้พลังการจากการเชื่อมต่อ USB กับคอมพิวเตอร์

2.7 สามารถวัดแรงได้สูงสุดที่ 9800 นิวตัน หรือประมาณ 1000 กิโลกรัม

2.8 สามารถกำหนดค่าได้ด้วยแพลตฟอร์มคู่สำหรับการเก็บข้อมูลซ้ายและขวาพร้อมกัน

2.9 แผ่นวัดแรงปฏิกิริยามีน้ำหนัก 10 กิโลกรัม

2.10 มีซอฟต์แวร์ในการวิเคราะห์ข้อมูล 2 ซอฟต์แวร์

- Ballistic Measurement System
- InnerBalance

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3. อุปกรณ์ประกอบ

3.1	แผ่นวัดความสามารถในการออกแรง	จำนวน	1	ใบ
3.2	กระเป๋าสำหรับใส่อุปกรณ์สำหรับพกพา	จำนวน	1	แผ่น
3.3	คอมพิวเตอร์พกพา	จำนวน	1	เครื่อง
3.4	สายเคเบิ้ล สำหรับเชื่อมต่อ	จำนวน	1	เส้น
3.5	Linear position transducer	จำนวน	1	ชุด
3.6	Strength Testing Rack	จำนวน	1	ชุด
3.7	คู่มือสำหรับการใช้งาน	จำนวน	2	เล่ม

4. เงื่อนไขเฉพาะ

4.1. เป็นผลิตภัณฑ์จากประเทศออสเตรเลีย

4.2. เป็นอุปกรณ์ใหม่ที่ไม่เคยผ่านการใช้งาน

4.3. รับประกันคุณภาพพร้อมทั้งความชำรุดบกพร่อง ตามสภาพการใช้งานปกติเป็นเวลาไม่น้อยกว่า 1 ปี

4.4. ผู้ขายต้องทำการติดตั้ง และแนะนำวิธีการใช้เครื่องให้ผู้ใช้สามารถใช้งานได้เป็นอย่างดี

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