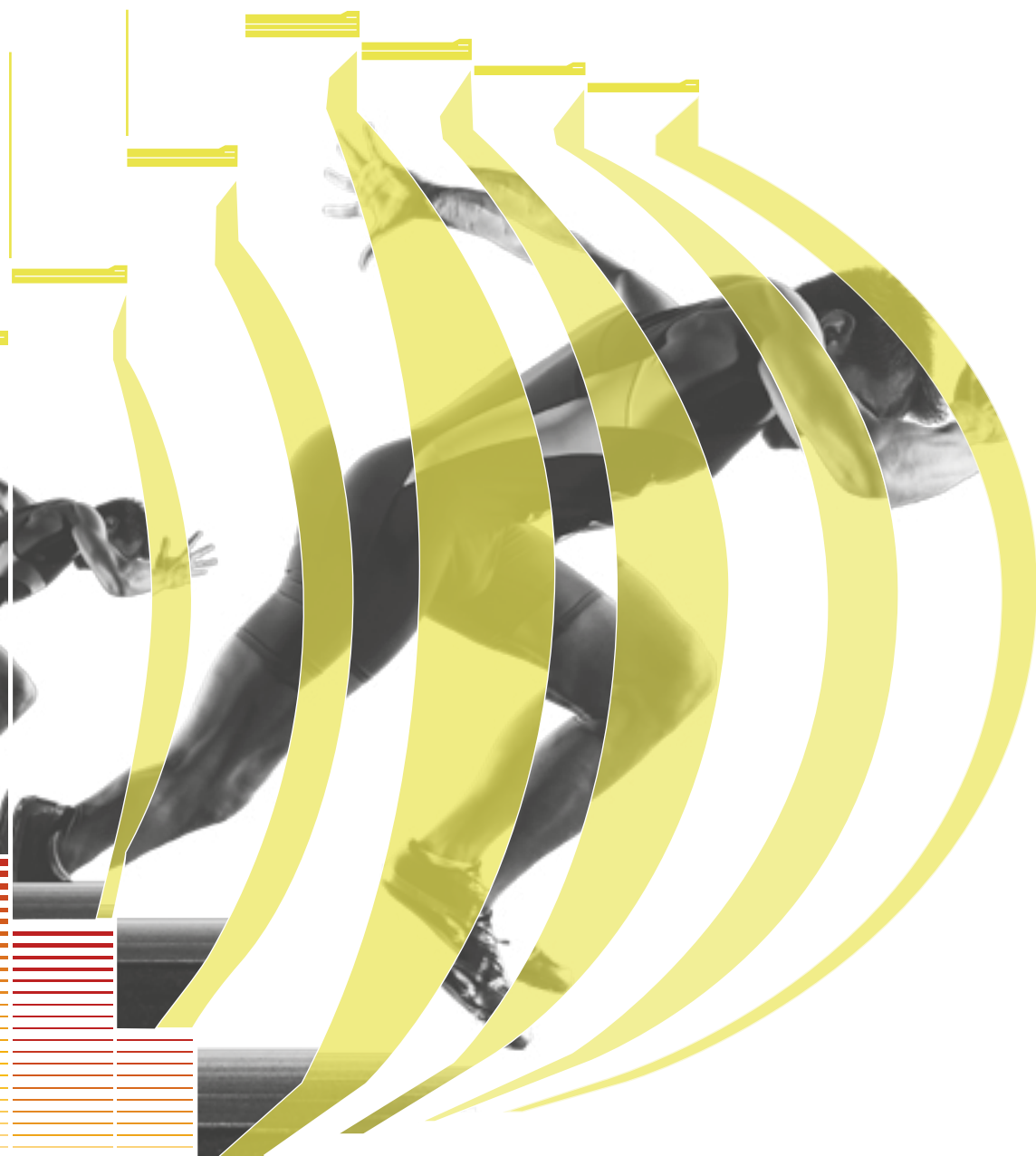


OPTOJUMP next

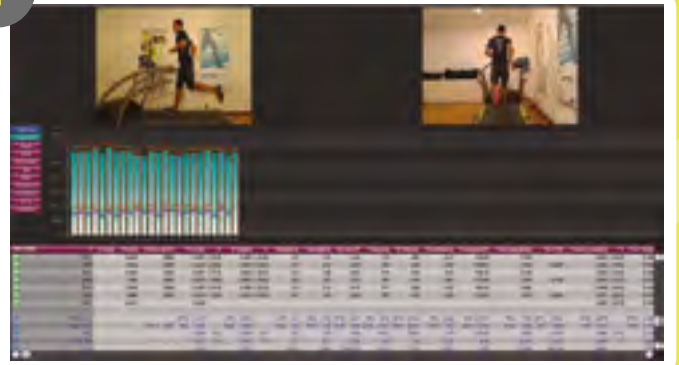
DISCOVER YOUR POTENTIAL



PERFORMANCE

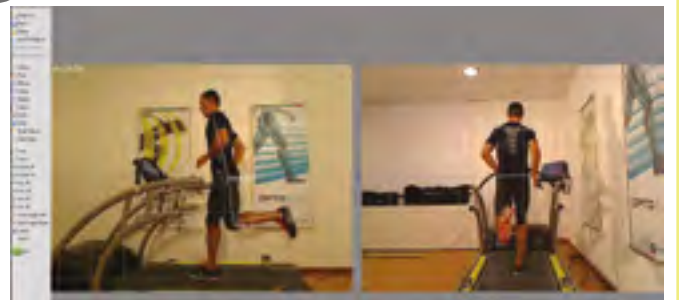
The three steps for a dynamic movement assessment

1



Test

2

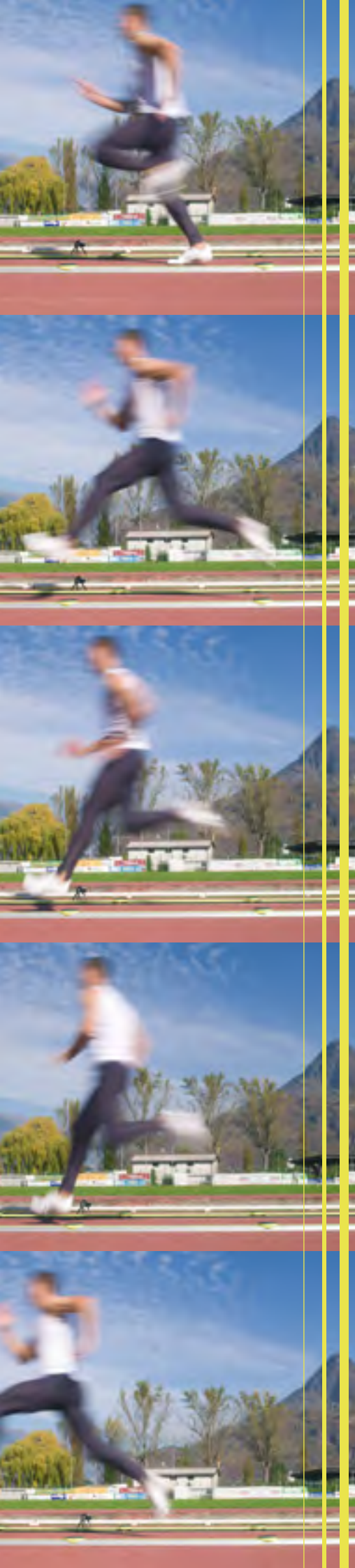


Analysis

3



Report





Optojump Next is an innovative diagnostic and work system that can be used to analyse and optimise a number of aspects associated with movement (force, reactivity, motor control and so on) and in functional assessments that are revolutionizing training and athletic preparation methods.

The system is equipped with optical sensors working at a frequency of 1000 Hz and having an accuracy of 1 cm, detecting the relevant space and time parameters for different motor movements, from jumping to tapping and running even running on a treadmill.

Direct measurement of this data, combined with video acquisition automatically integrated in real time, permit objective and qualitative analysis, introducing a new philosophy of performance monitoring, assessment and optimisation as a support for a specific customized training programme.

The software platform allows to easily store all tests carried out and recall them instantly, if necessary. It is furthermore possible to compare very quickly and easily data of tests carried out at different times even by different athletes, in order to assess the validity and the efficiency of the methodology applied maximizing results.

Optojump Next therefore makes it possible to:

- > Assess objectively general physical conditions
- > Identify deficiencies in strength, explosiveness, postural problems and asymmetries on the basis of data and videos
- > The development and application of retraining programmes, correction and optimization of the athlete's movement (running, jumping, change in direction etc.) based on numeric data
- > Prevention of recurrences, complications and setbacks in the pathological or post-injury condition, thanks to the immediate finding provided by the numeric value
- > Periodically verify the results and the efficacy of training
- > Improve identification of the Return to Play or Return to Work moment
- > Compare post- and pre-training or –accident values if available
- > Verification, in a dynamic situation, of the efficacy of shoes, orthopaedic inserts, muscular taping etc.
- > Run analysis and run efficiency optimization
- > High intensity work thanks to the Biofeedback function in real time – reprogramming movement patterns



PRACTICALITY

Quantitative and qualitative assessment

Optojump Next acquires numeric parameters relating to gait, running and jumping in real time, for the user to view immediately.

The option to create reports that are easy to read and contain all the main values, makes asymmetries between the left and right lower limbs and the variability coefficient of the movement expressed, namely the motor pattern, readily available.

Optojump Next does not stop at measuring numeric data. Thanks to one or two webcams that can be placed as needed, images of the tests conducted can be acquired, automatically and in real time synchronizing them with events measured. Without having to perform any calibration or synchronization between the hardware and cameras, numerous advantages can be derived from a cross-verification between data and images. The software makes some dedicated functions available dedicated to the graphic analysis of the images: by using a variety of instruments (angles measured, markers inserted, etc.) every photogram of the video recorded can be analysed...

What is Optojump Next?

Optojump Next is a system for optical detection made of a transmitting and a receiving bar. Each one contains 96 LEDs communicating on an infrared (therefore invisible) frequency with the same number of LEDs on the opposite bar. Once positioned on the floor or on the treadmill, the system detects interruptions in communication between the bars - generated by the athlete's movement - and calculates the duration and position. During the execution of a running, gait or series of jumps test, the contrast and flight times can be measured with an accuracy of 1 thousandth of a second and the position of the interrupted LEDs with a space resolution of 1 cm. Starting from these base data, the dedicated software measures in real-time a series of crucial data for the movement analysis. The system acquires numerical parameters in real-time for gait, running and jump tests, allowing to view them immediately*.

The absence of mechanical parts ensures longevity, precision and repeatability.

* see the summary table to verify the parameters available with each test



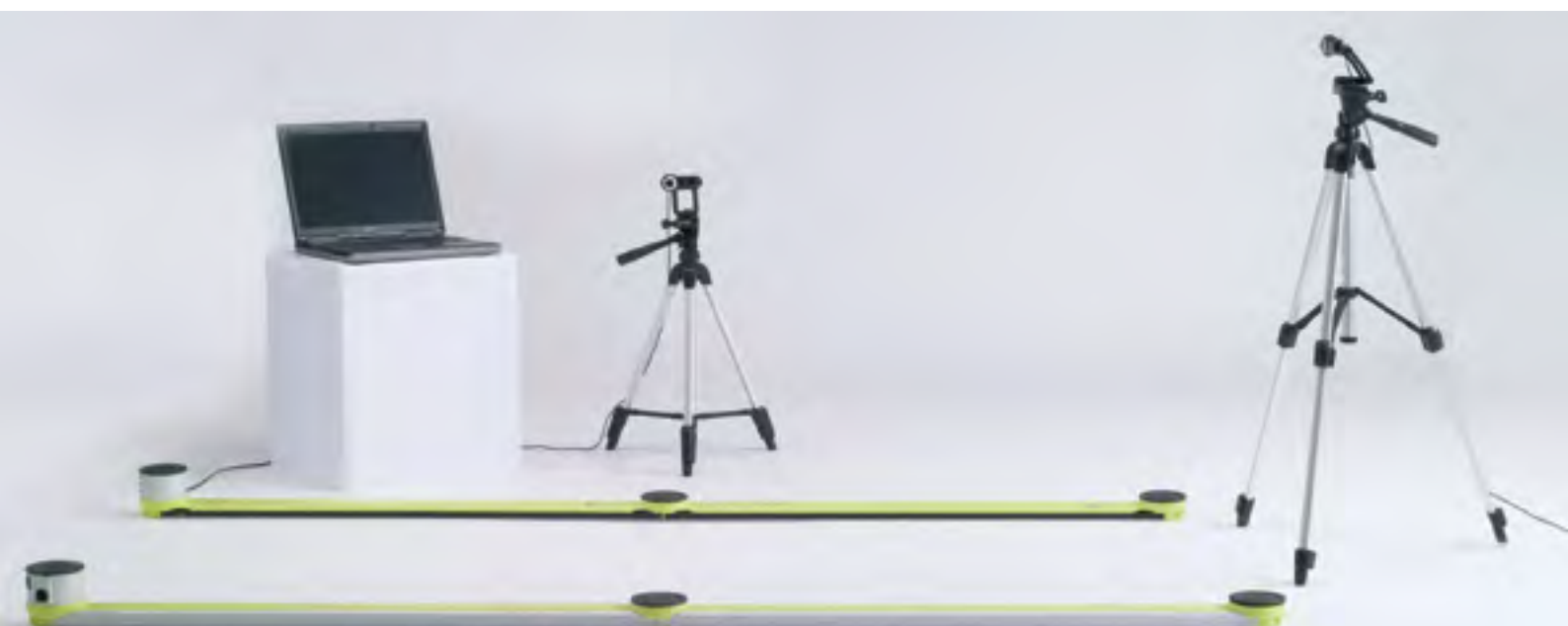
AND PRECISION

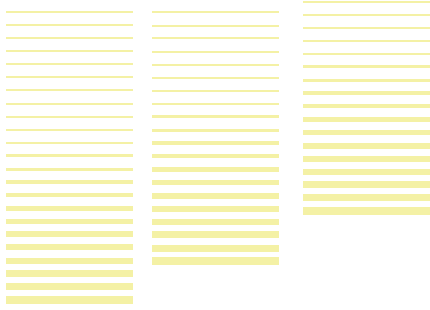
Portability combined with ease and rapid installation anywhere

The light weight and convenient bags (trolleys for the modular system) make the Optojump Next fully mobile. Along with the fact that the system has batteries, this means it can be used anywhere tests are conducted, whether in the gym or the sports field.

The system is also extremely easy to install: the bars are positioned on the ground and the receiver + webcam are connected to the PC using the USB cables, and the Optojump Next is ready to use. The maximum distance between bars is 6 metres and no connecting cables are needed between them, to maximize movement of the bars and minimise inconvenience for the athletes taking the test.

The correct system alignment is indicated by a green LED. If the bars are not parallel or if there is any imperfection in the ground preventing proper communication between the transmitter and receiver, the LED produces a red light to immediately notify the user.





Single Meter

dim. 100 x 8 x 3 cm
weight 2,1 kg



The Single Meter

In this configuration Optojump Next carries out various test types*:

- > Run analysis: positioned on the side spaces of a treadmill, Optojump Next becomes a mobile lab for small spaces at a contained cost. The system is compatible with the wide majority of treadmills and no synchronization is necessary to start and carry out a test.
- > Thanks to the biofeedback function, neuromuscular type works can be managed with the athlete creating a programme of training or retraining for specific motor patterns.
- > Various jump tests: in addition to classical strength measuring, explosiveness and elasticity test (thanks to some pre-set tests such as Drift, 5 Dot Drill, Single Leg 3 Hops) it analyses pliometric capacity, stabilisation ability, reactivity and resistance. At the same time, the user can easily create customized tests or protocols.
- > Tapping/frequency test: this type of test is ideal for analysis and exercises where separate and comparable results are required for the left and right foot (e.g. tapping/frequency test, side movement, walking on the spot, etc.)
- > Reaction test: this test detects the time between one optical/acoustic impulse and the athlete's movement. It can be used to measure simple reactions or more complex movements.

The single meter can be battery operated (autonomous for approximately 8 hours) or connected to the power supply.

* see the summary table to verify the parameters available with each test



The Modular System

In this configuration, OptoNext carries out*:

- > **Running Test:** it can be done in various modes: to analyse various stages of the race for example starting from a still position to analyse acceleration; another example is to look at a specific sector during a longer run, identifying how incremental fatigue affects the athlete on every lap. The system provides a series of space-time parameters that characterise the athlete's motor ability both in terms of symmetry as well as efficacy (acceleration, stages of contact with the ground - coming into contact, stabilization - propulsion stage - theoretical race corner, etc.). The running test with this configuration permits total flexibility in integrating specific movements to better characterise analysis and work as an example changes in direction, jump and running, obstacles/hurdles,...
- > **Gait Test:** the gait, as basic motor patterns, can be analysed comprehensively for all classical space-time parameters of Gait Analysis; it is possible to manage tests with simple exercises (movement from point A to point B), but also more complex tests, for example "go and come back" or walking backwards. They can then be made more complex by the user by introducing obstacles (e.g. plastic cones), dual tasking or other actions**.

Thanks to the practical and innovative assembling system using special interconnected caps, the modular system is assembled in a few minutes and does not require cables to connect the bars or further net adapters. The length goes from a minimum of 2 meters to a maximum of more than 100 meters.

* see the summary table to verify the parameters available with each test

** Some specific functions of Gait Analysis are limited on Optojump Next and available only on the medical Optogait system.



The Two-Dimensional System

With OptoJump Next, motor analysis is more in-depth, evaluating the dynamic stability of the athlete. Special cables make it possible to simplify a two-dimensional configuration (up to a maximum of 5 x 5 metres) inside of which the analysis can be done. The result is that a rectangle or square can be created, inside of which the analysis acquires value for aspects of coordination and movement management - specific tests can identify whether there are deficits in the proprioceptive, stabilization, strength control, and main muscle groups (walking on the spot, monopodal jumps, 3 hops protocol).



The software

The interface with which the Optojump Next system is managed is divided into three main sections: Athletes' Personal Data, Tests and Results.

Athletes' Personal Data

This is the section where the athletes' profiles are created and stored. A profile can contain all sorts of information: personal data, notes, athlete photo, etc. Each athlete can be added to one or more groups or subgroups. Therefore the Athletes' Personal Data can be fully customized and adapted to the user's requirements, and imported and/or exported from/to other programs or formats (xml, Excel, etc.). In the Athlete's Personal Data section, video can be uploaded and pictures taken of the athlete on the webcam to optimally characterise his/her functional behaviours, such as a squat movement or standing upright for some seconds with eyes open/eyes closed, etc. In this module also, every image can be analysed using the graphic tools available.

Test

This section is the software's nerve center. It is accessed for the configuration of new tests (jump, reaction, running, etc.) and to perform tests by choosing from the pre-defined tests or those created by the user. It is furthermore possible to group several tests (protocols), if this is useful for measuring the athlete's particular capacities or conditions (some protocols are already pre-configured, e.g. for measuring reactivity and dynamic stability).

During the test, the user receives three kinds of feedback in real-time: numerical, graphical and video (from one or two webcams).

Once confirmed the test, all three types of data are stored and are available for immediate editing or further use in future. The user can also temporarily hide certain unnecessary information (e.g., if the video is of importance for the user, the images can be viewed full-screen).

Results and Video Analysis

The tests carried out previously and saved can be recalled at any moment accessing the Results area. Selecting a test and clicking on 'View', (numerical or graphical) data can be compared with the images. The video support is very helpful for the user for a qualitative type evaluation, to better identify any of the athlete's particular compensation, limits, or behaviour. In fact, thanks to the 'video memory', possible anomalies of the numerical data can be easily identified and motivated. The video images are synchronized with the data. This allows to verify with accuracy what has happened at the time of acquisition of a certain value (e.g. if a contact time is extremely long, it is possible to look for the cause viewing the images of the instant, when the value has been recorded).

The video reproduction speed can be reduced down to a still image, to view the video frame-by-frame. A video analysis utility is also provided, with traditional tools such as lines, arches, circles, text, ruler, goniometer to measure angles and other.

In the Results section two or more tests can be compared ('Compare' option) using the video as well as the data, having all necessary information at disposition. This allows to quickly and intuitively carry out an analysis of quantitative and qualitative differences between tests carried out at a different time (pre-/post- rehab, for example) or between different patients (healthy and rehab). If more than two tests are to be compared, the 'History' function must be used, which allows to select an infinite number of tests to verify the athlete's parameters (indicated when a patient's progress must be measured constantly carrying out numerous tests).

All data, numerical and graphical, can be exported to the most common formats.

Report

A detailed report can be printed for every test conducted and saved, and for every protocol, with all the information relative to the same. The report is made up of numeric data, graphs of the individual parameters and any notes and images saved by the user.

The reports can be customized by inserting their logo and establishing which graphics, photos or personal notes to print.

* see the summary table to verify the parameters available with each test



Real time viewing of the data acquired during performance of a test, with video analysis, graphs and numerical data of the specific parameters. The data saved can be retrieved and analyzed in any moment.



Processing of a video still image acquired during a test, with the possibility of graphical interventions and measurements of angles and lengths.



Comparision of similar tests with comparizon of the numerical and gra-phical data and synchronization of the videos.



A detailed report can be printed for every test conducted and saved, and for every protocol, with all the information relative to the same.

Audio and video biofeedback instruments

The Videofeedback module

The main idea of this feature is to work with the athlete demonstrating the main parameters of the test he/she is carrying out in real time.

This way, the athlete can be invited and forced to “correct” and improve some aspects autonomously or anomalies in his/her motor movements, thanks to neuro-muscular type, high intensity work. In this way, Optojump Next becomes more than an excellent diagnostic tool, it becomes a tool that can help athletes in a simpler and more immediate way understand, control and correctly implement the desired motor patterns.

The athlete’s attention can be directed at the absolute value concept (for example, reduced contact time, stride length, rhythm etc.) as well as the concept of asymmetry, or the difference between the right and left limb (in % value) compared to a particular parameter. A classic example can be running on a treadmill; the athlete is shown a specific parameter on his/her run (an interesting parameter might be flight time, typically asymmetrical in an amateur athlete due to leg recall) and obviously the trainer can explain the correct motor movement to carry out; numeric asymmetry feedback (%), on a histogram representing the difference between the two limbs, helps the athlete to understand and adapt rationally and precisely to the desired motor pattern. The trainer can define different thresholds-goals on a case by case basis for the athlete, highlighting using different colours: green (good: meets the goal), yellow (warning: slightly misses the goal) and red (bad: totally misses the goal).



Metronome

The “Metronome” is an auditory stimulus that helps to involve the person’s attention on the main movement to do.

The software sets different patterns and rhythms; thanks to this rhythmic - auditory aid, it is possible to work with the athlete on some macro areas, improving, for example, run speed, extension of the step, symmetry, contact times etc.



Integrating external devices

The OptoJump Next Software can manage a series of external devices such as timing systems (Witty is integrated as standard), inertial system Gyko and heart rate monitor system (in line with specifications shown in the manual).

Timing system: Witty

OptoJump Next can be used in combination with the Training WITTY timing kit, thereby integrating information from OptoJump Next with trial times. Runs or sprints can be analysed in his/her dynamics, and the stages, from intermediate to final, can be recorded precisely and coherently.

Photocells are simply placed in the desired points and the Witty timer is connected to the PC via USB: OptoJump Next software will automatically recognise the device.

The photocells will transmit the impulse, which will then interact with the software.

Inertial sensor - GYKO

The Gyko inertial system is automatically recognized and synchronized with OptoJump Next software and integrates various tests, providing parameters fully comparable with a strength platform. The parameters are summarized by control indexes, coordination and movement fluidity, using a simple, easy to read method.

- > Run and walk tests: front-posterior and medial-lateral imbalance, main breadth of the control strategy, coordinating index between legs and core, and so on.
- > Jump test: duration and work during the eccentric and concentric phases, strength, speed, maximum power, Rate of force Development, Landing Rate, and so on.
- > Sway/posture tests: length and area of movement, speed of travel time of the stance and frequency of the oscillations

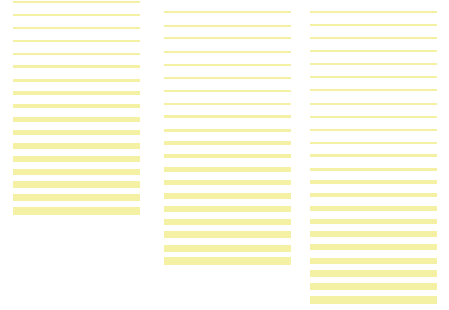
At the end of every session, the summary report can be displayed verifying the quality of the work done: a pie chart will show how much the athlete has worked and met and not met the set threshold-objective.

Heart-Rate Monitor

The athlete wears a compatible heart monitor during the test and this could be connected to the software (in line with the specifications for each individual device), his/her heartbeat is recorded and associated in real time to all the parameters recorded during the work. This assesses the association between the cardiovascular and bio mechanical behaviour of the movement in real time, including fatigue and impact on performance (e.g. asymmetry when running, contact time between a series of jumps, etc.).

The tests graphs can also be personalised for every athlete, using coloured monitors, the so-called “Sport Zone” according to the maximum frequency and the rate at rest.





Data table available for each test

In addition to the data listed, mean, standard deviation and variability coefficients are available for each individual test; for some types of test, featuring monopodal movements (running, walking, running on the spot, skipping), data is also differentiated for the LT or RT limb, with percentage difference between the two.

	Sprint and Gait test	Treadmill Gait Test	Treadmill Run Test	Jump Test	Tapping Test	Reaction Test
Stance Time	X	X				
Swing Time	X	X				
Step Time	X	X	X			
Gait Cycle	X	X				
Single Support	X	X				
Double Support	X	X	X			
Loading Response	X	X				
Pre-Swing	X	X				
Step Length	X	X	X			
Stride Length (or Double Step)	X	X	X			
3 Foot Phases (Contact, Flat, Propulsive)	X	X	X			
Cadence/Rhythm/Pace	X	X	X	X	X	
Speed	X					
Acceleration	X					
Flight Time	X		X	X	X	X
Contact Time	X		X	X	X	
Height	X		X	X		X
Stride Angle	X		X			
Imbalance	X		X			
Specific Power			X	X		
Jumping Point				X		
Jumping Point Gap				X		
Used Area				X	X	
Reaction Time						X



MICROGATE Srl
via Stradivari, 4
I-39100 Bolzano (BZ) Italy
Tel. +39 0471 501 532
Fax +39 0471 501 524
info@microgate.it
www.microgate.it

