GYKO

Gyko is a new device, developed by Microgate, for obtaining information about the kinematics of any body segment as it performs a certain physical movement.

Gyko contains the latest generation components that are used for carrying out accurate and repeatable measurements of acceleration, angular velocity and magnetic field in three dimensions.

- 3D accelerometer, to measure the linear accelerations to which the device is subjected.
- 3D gyroscope, to measure the angular velocities of the device.
- 3D magnetometer, to measure the magnetic field to which the device is subjected.

Gyko is capable of providing data measurements up to 1000 times per second (1 kHz), thus guaranteeing extremely high temporal resolution of the data. The system is started via a software interface (Optogait, Optojump Next or RePower) and the collected data are transferred to a PC in real time via a Bluetooth 4.0 connection. At the same time, the data are also saved to the MicroSD card on the Gyko device itself.

Gyko is supplied with a range of supports (vest, belts of various sizes and a magnetic support) for optimum positioning and securing of the device.

On the basis of the measured data, Gyko uses specific software algorithms to describe the kinematics of the analysed body segment and provide the user with simple, immediate information about the execution and quality of the physical movement.

Gyko can be used in conjunction with the OptoJump Next and OptoGait systems, or independently using RePower software.

The name Gyko is an acronym based on four fundamental concepts associated with the analysis of movement, namely Gravity, Gyroscope, Kinematics and Control.

MICROGATE

GYKO IN CONJUNCTION WITH OPTOJUMP NEXT AND OPTOGAIT

OptoJump Next and OptoGait represent the most advanced system for obtaining information about lower body movement. They provide quick, accurate measurements of the space-time parameters of the walking gait and running gait, and the flight and contact times involved in jumping.

Gyko for walking and running analysis

The gait analysis is one of the most widely used methods to determine any disorders of the nervous and/or musculoskeletal system. With Optojump Next and OptoGait you can estimate the space-time parameters of the gait and isolate individual phases of the step, then accurately describe the behaviour of the lower body.

When positioned below the shoulder blade, Gyko complements the measurements taken on the ground with the kinematics of the trunk, in such a way as to concisely highlight their dynamism, stability coordination.

The movement of the trunk is analysed in each phase of the step and, through specific algorithms, the following parameters are estimated:

- Antero-posterior and medio-lateral imbalance.
- Main directions and breadth of the movement of the trunk.
- Upper Phase Coordination Index (UPCI) that describes coordination in the rotation of the trunk.
- Phase difference between the lower body and the upper body.
- RMS, Harmonic Ratio and Harmonicity index describing gait stability.

Gyko for jump analysis

Vertical jump analysis has always been a widely used method for evaluating lower limb muscle strength. OptoJump Next and Optogait provide quantified, objective measurements of the main parameters of a jump, such as flight and contact time.

When positioned near the centre of mass (using the belt provided for the purpose), Gyko complements the temporal data with a range of information about the dynamics of the jump. It is then possible to measure lower limb strength directly, and provide accurate, repeatable data relating both to the eccentric loading phase and the concentric thrust phase.

The movement of the trunk during the flight and contact phase is analysed and provides, among other things, the following additional parameters:

- Eccentric and concentric work and duration.
- Force, Velocity and Maximum Power.
- Rate of Force Development and Landing Rate.

Gyko for posture analysis

Postural analysis is frequently used to evaluate the stability and balance of a subject standing still and upright.

Gyko enables you to determine - quickly and easily - the best-known indexes of body sway, and view a projected graphic representation of them.

The main indexes returned are:

- Sway length and area.
- Sway travel speed.
- Sway frequency

GYKO STAND-ALONE

Gyko can also be used in a stand-alone version, i.e. without needing to be associated with **Optogait** or **Optojump Next**.

GykoRePower

RePower is the dedicated software for use with **Gyko**. By calculating and presenting data quickly, simply and intuitively, it enables you to analyse the condition of patients or sportspeople and work with them in their rehabilitation or training programme.
The software is divided into two sections, **Rehab** and **Power**, which are specifically dedicated to rehabilitation and training respectively.

Rehab section

The **Rehab** section implements protocols for the evaluation and monitoring of joint and muscle functionality when rehabilitating a certain section of the musculoskeletal system.

A traumatic event involving the musculoskeletal system forces the individual to a period of immobilisation. During the rehabilitation process, the therapist's task is to help restore patients' muscle strength to a level at which they can resume their normal daily activities (walking, going up stairs, running, etc.).

It is therefore essential to be able to evaluate patients' muscle strength objectively, because this is the only basis on which you can draw up a personalised training programme and continually monitor its effectiveness.

The **Rehab** section of **GykoRePower** makes it possible to:

- **quantify** deficits in joint function or muscle strength (by comparing one limb with the other, or comparing the same limb at different times, before and after an injury);
- **evaluate and measure** the subject's balance in different situations and/or on different surfaces;
- **monitor** exercise intensity with real-time, visual bio-feedback by means of a work threshold that can be set at the desired level;
- **trace and report** the subject's recovery throughout the rehabilitation process.
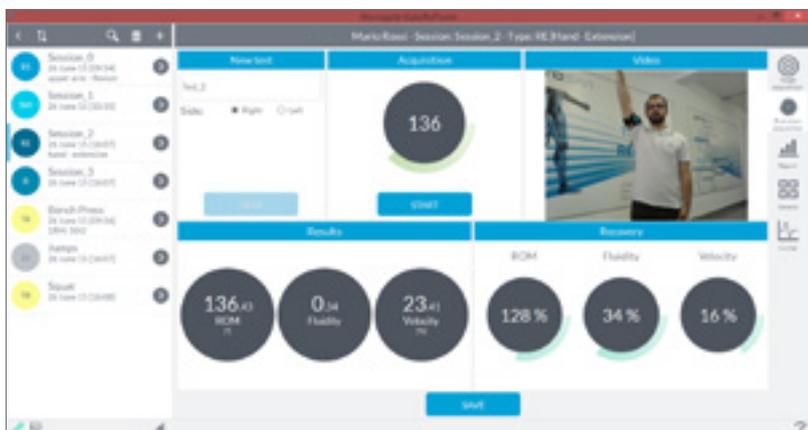
Power Section

The **Power section** is specifically designed to evaluate and monitor sporting performance, particularly in relation to the analysis of muscle strength and work on its development.

The **Power section** is aimed at anyone who wants to add a scientific basis to their sports training, through the quantitative and therefore objective evaluation of motor tasks. **GykoRePower** combines the requirements of accuracy and reliability with technological innovation. In a few simple steps, **GykoRePower** provides essential information, accurately and repeatably, at the various stages of a sports training programme, thus making it possible to monitor a sportsperson's condition and compare their performance over time.

By measuring the force imparted to a load, the system is able to measure the power exerted during a specific exercise. The system is therefore capable of calculating a sportsperson's muscle profile and dividing it into the various categories of muscle fibre recruitment (rapid, explosive, dynamic and maximum). On the basis of this profile, trainers can then draw up personalised training programmes with specifically tailored load and power levels, and monitor their trainees' progress during exercise.

The **Power section** also enables sportspeople to manage their own training by means of real-time visual and audible biofeedback on the correct performance of the exercise with respect to the goals set (work area).

GYKO Technical Data

Weight	46g, battery included
Dimensions	73 x 51 x 23 mm
Operating temperature	0° C/+45°C
Processing unit	ARM 32 bit microprocessor
Inertial sensor resolution: **Accelerometer** **Gyroscope** **Magnetometer**	$\pm2G - \pm16G$ $\pm250°/s - \pm2000°/s$ $\pm4800\mu T$
Sampling frequency	10 Hz – 1 KHz
Radio transmission	Bluetooth 4.0
Micro-SD card memory	4 Gb standard (up to 128 Gb)
Power supply	Internal polymer lithium battery, external 5VDC power supply (USB)
Battery life	5 hours (in data acquisition, with Bluetooth and SD card active)
Connections	• MICRO USB type B connector for charging and connecting to a PC • Input and output connection jack • Micro-SD slot

PB PERFORM BETTER

MICROGATE

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