



Metabolic Exercise Testing in sport  
one breath ahead

## Know Your Capabilities for better Performance

Innovative performance testing from CORTEX

Physical performance depends on the reliable functioning of the Metabolic Exercise Testing system. In sport in particular, maximum physical performance can only be achieved if metabolism can be adapted to the demands of training. First, this requires regular medical monitoring of the exercising individual and, secondly, training results must be objectively measurable so that training exercise schedule can be rapidly adapted.

As a noninvasive examination, Metabolic Exercise Testing plays a vital role here. Predictive parameters for cardiac and respiratory function and metabolism can be determined simply and rapidly in a single test and combined with further measurement procedures. As a result of cutting-edge technology, the exercising individual can now be monitored by Metabolic Exercise Testing, either under standardized laboratory conditions or directly in the field.

In your expert hands Metabolic Exercise Testing with ECG recording is an excellent and cost-effective tool for performance testing, as well as for planning and monitoring training. CORTEX, with its all-round expertise, is your partner in this endeavor. As world market leader in mobile Metabolic Exercise Testing we understand your work and know your requirements.

## Metabolic Exercise Testing in Sport

Simple, accurate and reliable

Looking for a simple procedure for performance testing in competitive sport? Want to assess and compare your athletes objectively "in the field"? Need a particularly cost-effective method to assess performance in sport and rehabilitation?

Adopt the gold standard for Metabolic Exercise Testing, performance testing and training management:

**Metabolic Exercise Testing** As a result of cutting-edge technology, small, mobile and portable systems are available to you for use in medical practice and during sporting activity. And that makes Metabolic Exercise Testing the gold standard in performance testing:

- You use a noninvasive procedure that provides feedback on performance and exercise tolerance in real-life situations – training, sport, rehabilitation
- You can immediately identify cardiovascular, cardiorespiratory and metabolic function deficits and can consequently make rapid adjustments to training programs and methods
- The sport-specific stress pattern is taken into account, and specific field tests are easy to perform
- The recorded data are more extensive than with lactate and heart rate measurements
- You receive objective and meaningful values with high sports medical relevance

# Metabolic Exercise Testing Pays its Way

Economic, multifunctional and flexible

We have given Metabolic Exercise Testing a new status: first, CORTEX systems are small, light and robust; secondly, our software concept provides very flexible and individualized options for use. Ease of maintenance and well-designed accessories make not only acquisition but also operation of our systems particularly productive.

Applications for Metabolic Exercise Testing include:

- Planning and monitoring of individual, targeted improvements in performance in elite sport
- Medical support for scoring and ranking in team sports
- University research and teaching with a valid study method
- Suitability tests for types of sport that make high demands on the metabolic system
- Monitoring of methods and results in rehabilitation sport

By means of practice-oriented software modules, our systems can be adapted to fulfill almost any sports medicine and performance testing requirement: you choose the specific module that meets your performance spectrum. Demonstrate your extensive counseling skills – our software modules such as CORTEX MSS Energy Metabolism and CORTEX MSS Exercise Scheduler will help you.



# Competence in Metabolic Exercise Testing

Our solutions

Just a few years ago Metabolic Exercise Testing was the domain of inpatient diagnostics – large, stationary systems prevented simple and practice-oriented use. CORTEX systems have changed all that. We are now the world market leader in mobile Metabolic Exercise Testing and have set new global quality standards. With modern know-how and as a result of an intensive exchange of experience with our customers, we are continuing to enhance our systems successfully. However, despite or perhaps even because of the increasing complexity, our self-imposed obligation is to ensure that Metabolic Exercise Testing is simple and cost-effective.

For indoors or outdoors, portable or mobile – at CORTEX you will find the right solution for your needs. Our product lines:

## METALYZER®

Practical, portable Metabolic Exercise Testing systems for practices and hospitals for complete medical functional analysis of the heart, lungs and metabolism at rest and during exercise. By virtue of the ECG connection and a variety of hardware and software options, these systems can be used for a particularly wide variety of applications.

## METAMAX®

Mobile wireless “indoor” and “outdoor” Metabolic Exercise Testing system for sport and training sciences and for occupational medicine under real exercise conditions. The mains-independent operation and wireless transmission ensure a particularly wide radius of operation, while numerous hardware extensions and coordinated software options provide a high degree of flexibility.

# METALYZER®

## Metabolic Exercise Testing redefined

Metabolic Exercise Testing for diagnosis, therapy and prevention – that is the focal point of our research and development. The METALYZER® systems in conjunction with our MetaSoft® Studio software are the key to our innovation. Whether as a single unit for Metabolic Exercise Testing or as a complete system for cardiopulmonary differential diagnosis – CORTEX measurement technologies and powerful, practice-oriented software solutions will convince you:

- Incomparable measurement precision as a result of cutting-edge sensor technology and simple, rapid calibration
- Individual and reusable masks available in different sizes
- Respiratory gas analysis using the breath-by-breath or mixing chamber methodology
- Measurement and monitoring of heart function via a heart rate chest strap or 12-channel ECG\*
- Small, light, portable: 24 x 17 x 9 cm weighing 1.3 kg, in a robust carrying case
- Additional diagnostic systems of other essential parameters and peripheral components\*
- Interfacing to practice IT systems\*
- Numerous software options\*

METALYZER® 3B (Breath-by-Breath-System): Part No. 220-01-008

METALYZER® II (Mixing Chamber System): Part No. 210-01-995



METAMAX® 3B (Breath-by-Breath-System): Part No. 130-01-992

METAMAX® 3X (Mixing Chamber System): Part No. 140-01-993

# METAMAX®

## Mobile Metabolic Exercise Testing

The METAMAX® is a mobile, mains independent indoor and outdoor Metabolic Exercise Testing system for sports and exercise science as well as for occupational medicine. Complete performance testing directly under actual performed activity. Thanks to the bidirectional wireless transmission and battery operation you can obtain previously unachievable freedom for your application. This means: put it on, connect it and measure. A variety of hardware expansions and complementary software options increase flexibility. The «International Forum Design» awarded the METAMAX® with the famous iF Product Design Award.

- Maximum measurement precision as a result of cutting-edge sensor technology and rapid calibration
- Extremely compact design, carefully designed body attachment and light weight (570 g including battery)
- Mains-independent operation for up to 15 hours
- Wireless range up to 1.0 km
- Respiratory gas analysis using the breath-by-breath or mixing chamber methodology
- Patented bidirectional transfer of test data and audio feedback for efficient management of the test subject
- Measuring the heart rate with a chest strap and recording the heart function with a 3-channel or 12-channel ECG\*
- Cutting-edge GPS technology to determine speed and altitude\*
- Integration of blood pressure devices and pulse oximetry systems\*

\* Options and add-ons

# Metabolic Exercise Testing in Practice

Multifunctionality – the vital advantage of CORTEX

## Performance assessment in professional associations







You need to undertake a technical analysis of the poor results of the A squad in the performance testing center of a bicycle racing team. To do this you use the CORTEX Metabolic Exercise Testing systems with their individually programmable workload profiles. You test all the team members with the METALYZER® 3B and MetaSoft® Studio software with ECG recording in just one day. With the objective results from the Metabolic Exercise Testing, you can now put together new teams with a matching performance profile and relegate less qualified cyclists. At the same time, using the CORTEX MSS Training Guidance module, you can produce new exercise recommendations for the coming cycle racing season.

## Metabolic Exercise Testing in mass sport

You look after several sports clubs in your home town: different types of sport and a variety of standards require the use of a flexible and effective procedure. You use a CORTEX complete system with METAMAX® 3B, MetaSoft® Studio software, 12-channel ECG, blood pressure module and system cart. You particularly appreciate the use of the METAMAX® 3B in sporting activity in the field and on various exercise equipment. Using the CORTEX MSS Exercise Scheduler and CORTEX MSS Energy Metabolism software modules, you can convert your analysis into specific exercise schedules and dietary advice. As a result of your targeted attention with Metabolic Exercise Testing, endurance athletes in particular can enhance their performance, correct the wrong type of exercise and identify health risks.



## This is how it works:

-  Prepare system
-  Enter or call up test
-  Prepare and connect
-  Perform measurement
-  Evaluate and interpret results
-  Print out and discuss results

## Motivation and documentation for weight reduction

As a sports physiotherapist you predominantly work with obese children and teenagers. The fear of physical exertion often makes it impossible to carry out suitable movement therapy successfully. Limited exercise intensity and a rapidly recognizable reduction in body circumference are therefore particularly motivational in such cases. Use the METALYZER® 3B mobile metabolic testing system – technology that fascinates teenagers and parents alike. Regularly print out reports generated automatically by the MetaSoft® Studio software to document results. Your clients and their parents can therefore track the course and success of therapy at all times. With MetaSoft® Studio software and the CORTEX MSS Energy Metabolism, CORTEX MSS Training Guidance and CORTEX MSS Exercise Scheduler modules you can immediately create dietary recommendations and plans for varied sporting activities.

## Precise data in sports science research

Metabolic Exercise Testing has long been indispensable in the university sphere. As a sports scientist you value ease of implementation of large-scale studies and accurate, recognized test methods that produce results in a short time. You use the METALYZER® and METAMAX® family systems from CORTEX and can regularly demonstrate the superiority of these particularly small and durable devices. The broad range of software and its customizability give you the breadth of study you need today to work in current fields of research. Even with limited research resources, you can produce impressive results with our cost-effective systems thanks to maximum data yield. The multifunctional CORTEX software modules can provide an efficient analysis for almost any problem in performance testing and differential diagnosis. You will benefit enormously from this excellent starting position when applying for larger projects.

# Intelligent Programmes

The CORTEX centrepiece: MetaSoft® Studio

**One Software for all Processes.** The core of all CORTEX systems is the application software called MetaSoft® Studio. It manages and monitors all processes of Metabolic Exercise Testing and controls all peripheral systems such as heart rate and blood pressure meters well as other measuring instruments.

**Tailored Metabolic Exercise Testing.** Intuitive workflows allow users to easily run all applications. Step by step, users are guided through the individual phases of Metabolic Exercise Testing. Based on a modular system, MetaSoft® Studio enables you to compile individual test and analysis processes. Each user can set up typical test processes and standardize them.

**Easy Handling.** Useful graphical displays make it easy to evaluate the measurements. The user can select from different display options or configure the display of test data according to his or her preferences. Reporting functions allow you to display the test results in a clearly structured form. The user can either use a mouse, a touch screen or a keyboard to run the programme.

**Perfect ECG Integration.** The product also offers integration of ECGs. The software supports numerous 12-channel ECG systems available on the market. The product meta control 3000 from CORTEX combines a spiroergometer and a proven 12-channel ECG from the company custo med. MetaSoft® Studio combines both systems bidirectionally forming an easy-to-use cardiopulmonary diagnostics system.

**Complete Pulmonary Function Diagnostics.** Together with Medical Equipment Europe, CORTEX offers a complete pulmonary function diagnostics. MetaSoft® Studio controls all pulmonary function tests and stores the test results. A patient administration programme included in MetaSoft® Studio and equally used for all examination tools simplifies the user's work.

CORTEX MetaSoft® Studio: Part No. 721-09-010



# Effective Training

Precise Determination of VT1 and VT2

The software feature CORTEX MSS Training Guidance determines the optimal training zones. It calculates individualised heart rate training zones for different stress phases and individual training goals and motivates users by precisely showing the progress gained.

**Effective Training.** CORTEX is the only company offering a training assistant which determines training zones based on two physiological thresholds: the anaerobic threshold (1. respiratory threshold) and the respiratory compensation point (2. respiratory threshold). As a result the heart rate training zones can be strictly delimited from each other at both thresholds. The athlete thus knows at any time in which training zone he or she is. Only this makes his or her training really effective.

**Manual Adjustment.** Main novelty in MetaSoft® Studio: The determined thresholds and training zones can not only be adjusted automatically, but also manually and easily.

**Various Reference Values.** To assess the individual fitness of an athlete or patient, the values determined in Metabolic Exercise Testing are compared with standardized scientifically proven values and displayed in an overview. MetaSoft® Studio also allows you to compare several test results of one or various individuals and groups with each other.

CORTEX MSS Training Guidance: Part No. 721-09-020



# Planned Success

## Effective Training with CORTEX MSS Exercise Scheduler

The CORTEX MSS Exercise Scheduler transmits the results of the Training Guidance to a clearly structured training plan that is structured like a calendar.

**Clear Training Cycles.** Based on the previously determined fitness level and defined parameters such as training goal, load increase, frequency and type of sport, the system generates training plans in a micro-, meso- and macro-cycle.

**Variety for Sport, Prevention and Rehabilitation.** The training planer has a comprehensive collection of reference training plans for various types of sports, prevention and rehabilitation measures. The planer also allows you to easily set up individual training plans.

**Motivation based on Overview.** Looking at the training plan, you always see the goals set. This motivates the athlete and progress is made quicker. This way, sport physicians and therapists can easily accompany the performance steps of their athletes and patients.

CORTEX MSS Exercise Scheduler: Part No. 721-09-021



# Check of the Energy Balance

## CORTEX MSS Basal Resting Metabolic Rate

The resting metabolic rate informs you of the individual energy balance of a test person. This rate is measured at rest and compared to expected values.

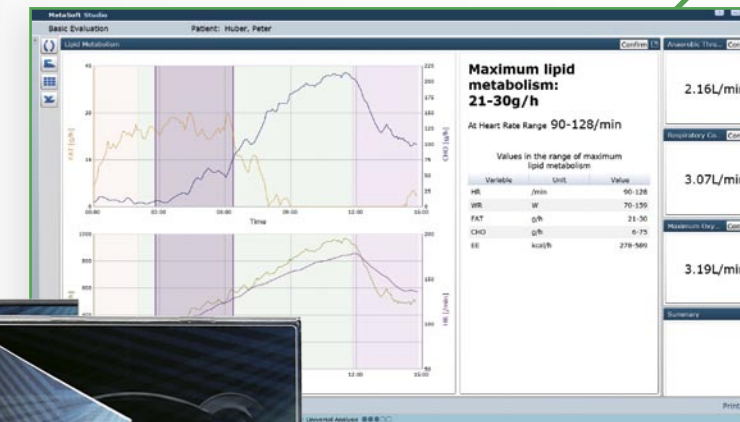
It is used and seen as a reliable basis for controlled calorie intake, for example in the context of a recommendation for individual nutrition or training.

CORTEX MSS Basal Resting Metabolic Rate: Part No. 721-09-023

## CORTEX MSS Energy Metabolism for CPET

A well functioning energy metabolism is an important prerequisite for proactive and sustainable health care. It can be improved if doing the right training. For this purpose, you must measure a person's energy balance and the fat and carbohydrate burning at increasing stress levels. MetaSoft® Studio then determines the ideal heart rate zones for a more economic metabolism.

CORTEX MSS Energy Metabolism for CPET: Part No. 721-09-022



# Integral Service

Optimally integrated hardware options



## Complete measurement set

This will provide you with everything. METALYZER® 3B Cardiopulmonary Exercise Testing system including breathing mask and volume sensor, 12-channel PC-ECG with electrode suction system, bicycle ergometer, PC system with two monitors and printer, CORTEX mobile PLUS system cart, MetaSoft® Studio software and operating system.



## Workload devices

CORTEX will provide you with all the current available workload devices from reputed manufacturers in their current, well-established design. We would be happy to provide you with further details personally.



## CORTEX mobile PLUS system cart

You remain mobile with everything to hand. CORTEX mobile PLUS system cart can carry the METALYZER®, PC, printer, two monitors, ECG and ECG electrode suction system, and blood pressure device. Move your complete Cardiopulmonary Exercise Testing system effortlessly to wherever you need it.



## Ipod® und Xpod®

Simple and flexible pulse oximetry

Ipod: External digital pulse oximeter system with sensor and oximeter mounted directly in the finger clip.

Xpod: Like the Ipod, but with applicationspecific sensors. With its compact size, Xpod is particularly suitable for mobile use with METAMAX®.



## Metabolic Exercise Testing and ECG

Besides the optional integrated 3-channel ECG for performance monitoring; most 12-channel ECG systems can be interfaced to the CORTEX systems. Moreover, CORTEX offers 12-channel ECG systems from well known manufacturers.



## Tango+

Motion-tolerant noninvasive blood pressure measurement. Automated, artifact-tolerant blood pressure and HR measurement with upper arm cuff specifically for treadmill application. External system with a wide range of applications.



## GPS module for METAMAX®

Even out in the field you can be kept informed about the current speed and altitude. Additional spatial data are recorded alongside the metabolic exercise test data and make it possible to specify the workload even without a bicycle ergometer.



## PC, Notebook, second monitor and color printer

Our MetaSoft® Studio software works with Microsoft® Windows® XP, Windows® Vista™ and Windows®7. On request we can supply you directly with the complete, customized hardware such as a PC or Notebook with operating system, second monitor and color printer.

# Metabolic Exercise Testing – an Integral Service

Innovation and competence from CORTEX

## We offer:

- Extensive on-site product training
- On-site installation
- Regular software updates
- On-site and hotline support
- A variety of seminars

All our products are CE certified and meet European standards for Quality and Safety\*.

In your area – our sales and service partners are competent and authorized. For us, competence in Metabolic Exercise Testing means constant technical innovation and close partnership – aspects you can rely on with CORTEX.

\* Quality – EN ISO 9001 / EN ISO 13485 / Directive 93/42/EEC; Safety – DIN EN 60601-1 / DIN EN 60601-1-1 / 60601-1-2 / 60601-1-4 ; DIN EN 14971



# Innovative Solutions for Metabolic Exercise Testing

That's what CORTEX stands for



With our two main product lines, METALYZER® and METAMAX®, we are pioneers in the field of medicine, sport and fitness. We achieve maximum performance in Metabolic Exercise Testing with innovative hardware and software.

Our solutions for Metabolic Exercise Testing are applied worldwide, ranging from basic research to routine cardiac diagnosis, from competitive sport to fitness centers. Physicians, therapists and coaches successfully use our systems in the fields of sports medicine, cardiology, pulmonology and occupational and re-

habilitation medicine, as well as in exercise and sports science.

CORTEX also stands for competence in extreme situations and high-level requirements - this has been demonstrated by our participation in the largest Everest medical expedition to date, the »Xtreme Everest« project (2007), and our involvement in many Olympic Training Centers.

Development, production and administration are located at our head office in Leipzig, Germany. From there we distribute our solutions for cardiopulmonary diagnostics to all continents via a worldwide network of local sales and service partners.

Please feel free to contact us.

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