# G-EO System™

## World's Most Versatile Gait Trainer

REHA TECHNOLOGY
FOR A BETTER LIFE

www.rehatechnology.com

# World's Most Versatile Gait Trainer

The G-EO System is the world's most versatile robotic gait trainer. Multiple different therapy options, such as partial movements, floor walking and the unique feature of realistically simulating climbing stairs, as well as the simple switch between passive, active-assistive and active mode allow for phase specific treatment of each individual patient throughout the whole continuum of care.

## Unique features of stair climbing and partial movements

## G-EO System showing superior results in various clinical studies

## Treatment of multiple patient indications

## Customized therapy to meet individual patient needs


# The Reha Technology Philosophy

### Patient and Therapist

Our philosophy is to facilitate the daily therapy routines for both the patient and the therapist. Our products increase therapy effectiveness and provide flexible treatment options to create the most efficient therapy conditions for each individual patient resulting in the best possible outcomes.

### Clinics and Hospitals

Our philosophy is to improve the clinical environment, providing therapy solutions that are simple to use and applicable for a wide range of patient indications. This enables the clinics to streamline internal processes and increase their reputation and catchment area.

### Robotic Rehabilitation Technology

Our philosophy is to provide innovative therapy solutions for our customers. We put great effort into the development of our devices in a close cooperation with engineers, doctors and users around the world. Simplicity and precision are the main driving forces in our innovation process to push the limits of robotic rehabilitation.

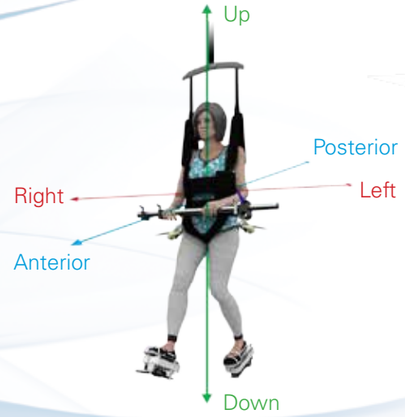
## G-EO System operating worldwide in more than 25 countries

# Wide Variety of Therapy Options

The G-EO System sets new standards in rehabilitation technology in terms of its great versatility, as it offers a wide range of different application possibilities. By choosing from a wide variety of therapy options, the therapy can be tailored to the specific needs of each individual patient to offer the best possible therapy throughout the rehabilitation process. The system can be individually adjusted to patients with different levels of functional ambulation capabilities (FAC 0 to 5).

## Full Control over Body Position

The G-EO System provides unique dynamic trunk and hip control - frontal, transversal, and sagittal. The therapist can control the patient's body position supporting the natural knee and hip extension and correct the movement of the hips and the trunk during the whole gait cycle.




# Stair Climbing

The feature of realistically simulating climbing and descending stairs allows the possibility of a complete rehabilitation pathway towards full recovery. It was shown that patients trained on the G-EO System on stair climbing improved their stair climbing ability to a significant larger extent than patients trained with conventional physiotherapy.* Stair climbing is an essential capability for patients to regain independency and get back to their daily activity.

*Hesse S. et al., Robot-assisted practice of gait and stair climbing in nonambulatory stroke patients, JRRD, 2012; 49: 613-622

Step left

Step right

# Floor Walking

Various parameters, such as the dorsiflexion, plantarflexion, the step length and the step cadence, can be set and adjusted during the therapy session. In combination with the body alignment of the patient on three different planes, the therapist has the necessary tools to provide the best possible treatment. By offering a realistic simulation of a physiological gait pattern, the G-EO System allows the patient to recover mobility and independency in daily living.*

*Hesse S. et al., Innovative gait robot for the repetitive practice of floor walking and stair climbing up and down in stroke patients, JNER, 2010; 7

Adjustment of dorsiflexion and plantarflexion

Step length ranging from 0 to 55 cm (21.5")

# Partial Movements

The G-EO System has the unique feature of partial movements which allow isolating and generating specific phases of the gait cycle allowing the therapist to set and combine up to six different training phases per individual leg in order to reproduce specific tasks such as pre-swing, swing and stance. Partial movements can be seen as the "first steps" to take into the gait rehabilitation process or as a specific training over isolated movements. They have been defined according to the phases of the gait cycle described by Dr. Perry.*

* Perry J. et al., "Gait Analysis: Normal and Pathological Function" 2010

Stance

Swing

Pre-Swing

# The Continuum of Care

The passive mode allows for the patient's early rehabilitation. The movements performed by the G-EO system are based on the physiological cycle, whereby the speed and step length can be set individually.

The Active-Assistive Mode* compensates for the patient's difficulties in self-initiating the gait movement. A predefined assistance will be activated when detecting patient inactivity and provides support in accomplishing the required task.

The Active Mode* allows the patient to self-initiate the gait training by overcoming a pre-selected resistance. The level of resistance is set by the therapist and can be seamlessly adjusted during the therapy. Pressure sensors measure and graphically reflect the force that is exerted by the patient.

*Available on floor walking and stairs climbing, G-EO System Evolution only

**PASSIVE**

**ACTIVE - ASSISTIVE**

**ACTIVE**

**FAC 0**

Patient cannot walk, or needs help from two or more persons carrying weight and with balance.

**FAC 1**

Patient needs firm continuous support from one person who helps with balance and coordination.

**FAC 2**

Patient needs continuous or intermittent support of one person to help with balance and coordination.

**FAC 3**

Patient requires verbal supervision or stand-by help from one person without physical contact.

**FAC 4**

Patient can walk independently on level ground, but requires help on stairs, slopes or uneven surfaces.

**FAC 5**

Patient can walk independently on level ground, stairs and uneven surfaces.

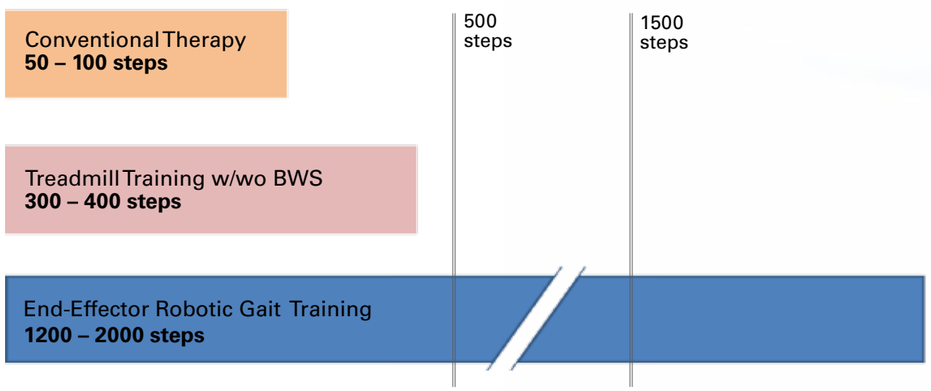
*Holden M. K., et al. (1984)*
*Clinical gait assessment in the neurologically impaired. Reliability and meaningfulness. Phys Ther 64(1): 35-40.*

# High Number of Repetitions per Session

## "Who wants to relearn walking, has to walk"

Prof. Dr. Stefan Hesse, Head of Neurology
Medical Park Humboldtmühle Berlin, Germany
Co-Developer of the G-EO System

## Sub-Acute Stroke Patients - Therapy Comparison (30 min. session)




# Better Therapeutic Outcomes

Two separate groups of 15 patients (sub-acute stroke FAC 0-2 at study start)

## End-Effector Gait Therapy

10/15 regain independency in walking at study end
4/15 were able to climb stairs at study end

## Conventional Physiotherapy

4/15 regain independency in walking at study end
1/15 was able to climb stairs at study end

*Hesse S. et al., Robot-assisted practice of gait and stair climbing in nonambulatory stroke patients, JRRD, 2012; 49: 613-622*

# Clinical Evidence

The G-EO System is based on the clinically proven end-effector therapy concept. The following publications show clinical evidence that patients who receive end-effector gait therapy have a significant higher rate of independent walking and are more likely to achieve superior gait ability compared to other therapeutic approaches.

| Publication | Indication | Compared to | Product Used |
|---|---|---|---|
| Hesse S. et al., Robot-assisted practice of gait and stair climbing in nonambulatory stroke patients, JRRD, 2012; 49: 613-622 | Stroke | Conventional Physiotherapy | G-EO System |
| Hesse S. et al, Innovative gait robot for the repetitive practice of floor walking and stair climbing up and down in stroke patients, JNER, 2010; 7 | Subacute Stroke | Conventional Physiotherapy | G-EO System |
| Sale P. et al, Effects of robot assisted gait training in progressive supranuclear palsy (PSP): a preliminary report, Frontiers in Human Neuroscience 2014; 8: 1-7 | Progressive Supranuclear Palsy | | G-EO System |
| Sale P. et al, Robot-assisted walking training for individuals with Parkinson's disease: a pilot randomized controlled trial, BMC Neurology, 2013; 13: 50 | Parkinson's Disease | Treadmill Training | G-EO System |
| Tomelleri C. et al, Adaptive Locomotor Training on an End-Effector Gait Robot. Evaluation of the ground reaction forces in different training conditions, IEEE Int Conf Rehabil Robot. 2011 | | Treadmill Training | G-EO System |
| Smania N. et al, Improved Gait After Repetitive Locomotor Training in Children with Cerebral Palsy, CME Article, 2011; 2 | Cerebral Palsy | Conventional Physiotherapy | End-Effector Gait Trainer (GT-1) |
| Mehrholz J. et al, Electromechanical-assisted gait training after stroke: A systematic review comparing end-effector and exoskeleton devices, J Rehabil Med 2012; 44: 193-199 | Stroke | Exoskeleton | End-Effector Gait Trainer |
| Mehrholz J. et al, Electromechanical-assisted training for walking after stroke, Cochrane Database Syst. Rev. 2013; 25:7 | Subacute Stroke | Conventional Physiotherapy | Robotic-Assisted Gait Trainer |
| Pohl M. et al, Repetitive locomotor training and physiotherapy improve walking and basic activities of daily living after stroke: a single-blind, randomized multicenter trial (DEutsche GAngtrainerStudie, DEGAS), Clinical Rehabilitation 2007; 21: 17-27 | Subacute Stroke | Conventional Physiotherapy | End-Effector Gait Trainer (GT-1) |

## G-EO System Compared to Conventional Physiotherapy (PT) in Stroke Patients

The training with the G-EO System and conventional PT leads to a significant superior gait and stair climbing ability compared to conventional PT alone in stroke patients. A higher intensity of the gait training with the G-EO System could explain the superior result.

Hesse S. et al.
Robot-assisted practice of gait and stair climbing in nonambulatory stroke patients.
JRRD, 2012; 49: 613-622

Gait and stair climbing training on the G-EO System with stroke patients activates the same muscles and results in the same muscle pattern as for real (conventional PT) training.

Hesse S. et al.
Innovative gait robot for the repetitive practice of floor walking and stair climbing up and down in stroke patients. JNER, 2010; 7

## G-EO System Compared to Treadmill Training in Parkinson's Disease

Simplicity of treatment, no side effects and the significant improvement on gait parameters encourages using the G-EO System on people with Parkinson's disease.

Sale P. et al.
Robot-assisted walking training for individuals with Parkinson's disease: a pilot randomized controlled trial.
BMC Neurology, 2013; 13: 50

## End-Effector Gait Training Compared to Exoskeleton Training in Stroke Patients

This meta-analysis shows that the end-effector gait training for stroke patients results in a statistically significant better outcome (in meaning of independent walking) compared to the exoskeleton based training.

Mehrholz J. et al.
Electromechanical-assisted gait training after stroke: A systematic review comparing end-effector and exoskeleton devices. J Rehabil Med 2012; 44: 193-199

www.rehatechnology.com/en/studies

# Treatment of Multiple Patient Indications

- Stroke (sub-acute and chronic)
- Parkinson's Disease
- Infantile Cerebral Palsy (ICP/CP)
- Multiple Sclerosis
- Spinal Cord Injuries (SCI)
- Traumatic Brain Injuries (TBI)
- Orthopedics, Traumatic Cases

Adults

Pediatrics

# Modules to Meet Different Therapy Needs

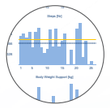
**Visual Scenario**
The Visual Scenario provides enhanced visualization of patient performance along with additional therapy options of walking in synchronized trails to increase patient motivation and awareness during each session.

**Knee Support Module (K Module, PK Module)**
The knee support provides the patient with additional knee stability at flexion and extension. A pediatric knee support is available for children as small as 90cm (3 feet) until 150cm (5 feet).

**Pediatric Module (P Module)**
The Pediatric Module enables treatment of children starting as small as 90cm (3 feet) weighing up to 75kg (165 lbs.) and includes the adjustment of the step width and the handrail system. The transition between adult and pediatric application is quick and simple.

**FES Module (F Module) by Hasomed®**
With the integration of the Functional Electrical Stimulation (FES) module, the therapist is able to add supplementary muscle activation through multiple stimulation channels.

**Heart Module (H Module)**
The Heart Module allows the integration of pulse and blood oxygen saturation into the captured data, as well as monitoring these parameters in real-time.



**Research Module (R Module)**
The Research Module eases the collection of data for medical studies. All sensor and patient data can be accessed directly and stored for further data analysis.

# G-EO System Robotic Gait Trainer Options

In addition to the modules to meet different therapy needs, the G-EO System is available in two versions, which can be chosen depending on the therapeutic requirements of the clinic or the hospital. The G-EO System Evolution is the state of the art device enabling the customer to take full advantage of all therapy options, including stairs climbing, partial movements and the active and active-assistive modes. The G-EO System Basic offers the core rehabilitation functions of floor walking and partial movements in passive mode.

## G-EO Evolution

- Floor walking & Partial movement
- Stair climbing up & down
- Passive, active & active-assistive mode
- Adult and pediatric application
- FES integration (by Hasomed®)

## G-EO Basic

- Floor walking & Partial movement
- Adult and pediatric application
- FES integration (by Hasomed®)

# Technical Data & Specifications


| | | | | | |
|---|---|---|---|---|---|
| **Length** | 406 cm (13’4”) | **Weight** | 900 kg (1,984 lbs) | **Max. step cadence** | 70 steps / min |
| **Width** | 124 cm (4’1”) | **Power supply** | 110 / 230V | **Max. step length** | 55 cm (1’10”) |
| **Height** | 280 cm (9’2”) | **Max. speed** | 2.3 km/h (1.43 mi/h) | **Ankle angle range** | -80° / +80° |

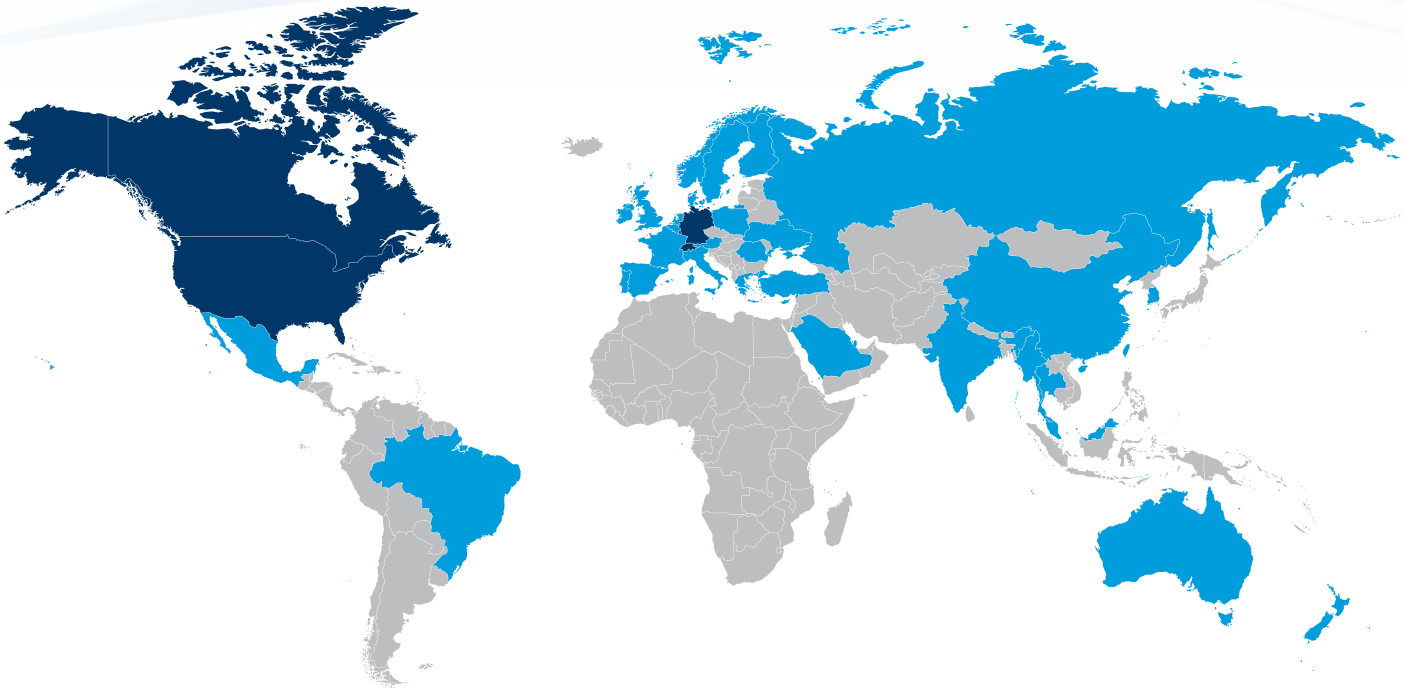
# Patient Requirements

| | |
|---|---|
| **Min. body height*** | 90 cm / 2’11” |
| **Min. body height** | 110 cm / 3’7” |
| **Max. body height** | 200 cm / 6’7” |
| **Max. body weight*** | 75 kg / 165 lbs. |
| **Max. body weight** | 150 kg / 330 lbs. |

***with pediatric module**

# Reha Technology's Direct Operations and Worldwide Distributor Network

Reha Technology AG is distributing products through a worldwide distributor network and direct operations. This network is continuously being expanded; the following world map illustrates current activities in a global perspective:



Direct operations by Reha Technology

Official distributor


**Headquarters:**
Reha Technology AG
Industriestrasse 78
4600 Olten
Switzerland

**USA East:**
Reha Technology USA, Inc.
1787 Sentry Parkway West
Building 16, Suite 450
Blue Bell, PA 19422

**USA West:**
Reha Technology USA, Inc.
Pier 17, Suite 800
San Francisco, CA 94111

**Germany:**
Reha Technology
Nordring 59
45894 Gelsenkirchen
Germany


For additional information visit **www.rehatechnology.com**

GS-PB/1703_EN