2-point gait oscillometer
“The WALKING®”

MicroStone Corporation
A gait measuring device that can display analysis results as soon as measurement is complete!

① The use of two wireless motion sensors allows simple trace measurement of the motion of the dorsal vertebra (upper back) and sacral (lower back) regions during walking, and automatic conversion to a numerical value!
② Animated display synchronizing the motion of the two points! The relationship between the two points is clear at a glance!
③ Side-by-side display of the two sets of data! Compare at a glance the difference before and after coaching!
How to measure

“THE WALKING” can be done only 3 steps **about 2min!**

**Step 1** Attach the sensors

- **Measuring device** MVP-RF8 Series
- **8-channel, compact wireless motion recorder**

*Use the specified harness and belt to attached the 2 compact wireless sensors to*

1. **the dorsal vertebral region** (= upper back)
2. **the sacral region** (= lower back)
“THE WALKING” can be done only 3 steps about 2min!

**Step2** Walk

Data transmitted wirelessly up to approx. 30m

Recommended: Walk 10 m or more in a straight line

Data are measured as you walk normally.
How to measure

“THE WALKING” can be done only 3 steps about 2min!

Step3 Analyze

Once the measurement is complete, the data is automatically analyzed and the results displayed on your computer.
Data analysis screen

Motion data during walking

<table>
<thead>
<tr>
<th>Sagittal Plane</th>
<th>Frontal Plane</th>
<th>Horizontal Plane</th>
<th>Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; Sagittal plane&gt;</td>
<td>&lt; Frontal plane&gt;</td>
<td>&lt; Horizontal plane&gt;</td>
<td>Cycle time</td>
</tr>
<tr>
<td>Top</td>
<td>Front</td>
<td>Left/Right</td>
<td>0.98 (sec)</td>
</tr>
<tr>
<td>Back</td>
<td>Right/Left</td>
<td>Front/Back</td>
<td>0.94 (sec)</td>
</tr>
</tbody>
</table>

Easy comparison between two measurement data

<table>
<thead>
<tr>
<th>Data1</th>
<th>Data2</th>
<th>&lt;Reference values&gt;</th>
<th>&lt;Reference values&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>good walking</td>
<td>Unbalance walking</td>
<td>Front/Back width</td>
<td>Top/Bottom width</td>
</tr>
<tr>
<td>13</td>
<td>32</td>
<td>46</td>
<td>45</td>
</tr>
<tr>
<td>30</td>
<td>32</td>
<td>37</td>
<td>53</td>
</tr>
<tr>
<td>51</td>
<td>59</td>
<td>37</td>
<td>53</td>
</tr>
<tr>
<td>48</td>
<td>29</td>
<td>46</td>
<td>45</td>
</tr>
<tr>
<td>51</td>
<td>59</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td>7.47</td>
<td>9.16</td>
<td>16.07</td>
</tr>
</tbody>
</table>
Data analysis screen

Examples of data analysis

Gait with good overall balance
The motion traces for the sacrum and dorsal vertebrae are similar. The body moves to the right and left as the foot hits the ground, spreading the impact.

Gait making little use of the muscular strength of the legs and area around the center of gravity
There is pronounced left-right motion in the upper part of the body. The movement of the arms compensates for the lack of muscular strength in the legs and area around the center of gravity and provides propulsive force.

Gait of a person with back pain
There is little left/right motion at the sacrum and dorsal vertebrae. There is a strong up-down impact when the foot hits the ground.
Deep Analysis

Scoring with 6 indicators

2-Point Gait Oscillometer MVP-WS2-S Deep Analysis

- Wobble of upper body
- Right-left difference of upper body back motion
- Coordination of muscle activity
- Smoothness of motion
- Right-left difference of waist motion
- Right-left difference of stability

These are examples. For more details please consult an expert (Physical therapist, etc.).

Recommended exercises are A and C.

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～Examples in the annual general checkup option menu～

“Walking posture check” using THE WALKING as an option menu at Saku General Hospital (Saku city) began from July 2016

**Contents**

1. Confirm walking form with THE WALKING  
2. Based on the results, physical therapists will guide walking  
3. Measure the walking form again and confirm the guidance effect

Price: 3,240 yen (tax included)  
About 15 minute checkup per person.  
Limited to 5 people per day  
There is an application for 4 people on average per day.
～Examples of health screening and work-related accidents prevention at companies

It is adopted by the Japanese largest automobile manufacturer and major electronic parts manufacturer!

Measurement and care of walking “Walking Care” to 80 employees of Japanese Company T (February 2017)

【Contents】
① Confirm walking form with THE WALKING
② After the measurement, we advised individually from “Health Fitness Programmer” and told points to be noted in our daily life.
Application

～Examples in the field of education and childcare

We performed walking measurement and guidance five times in a year, and 80% of children showed improvement in walking.

Measurement and care of walking “Walking Care” to 43 senior children of nursery school in Saku city. (April 2016 - February 2017)

【Contents】
① Confirm walking form with THE WALKING
② After the measurement, we advised individually from “Health Fitness Programmer” and told points to be noted in our daily life.
③ Points to be noted in everyday life and advice items were carried out by the homeroom teacher on a daily walk.
Validation

Comparison with VICON (motion capture system using camera)

Results of VICON data and our system data are mutually correlated.

\[ R^2 = 0.933, p < .01 \]
\[ R^2 = 0.811, p < .01 \]

Trajectory displacement

“Development Of Walking Ability Evaluation Method With Accelerometer And Gyrometer”
Tasuku Ito, Macky Kato (Waseda University)
Validation

Possibility to evaluate fall risk

Experienced people have a tendency for the lateral sway of the lower trunk to be small. Horizontal sway: upper body trunk > lower body trunk

<Research conditions>
Subjects: over 60 years old 111 people
Average age: 67.3
Walking length: 10m
Walking with barefoot
Measurement position:
  - Upper body trunk: T10
  - Lower body trunk: sacral
Measuring equipment:
  - VICON MX-System (200Hz)
  - AMTI Floor reaction force meter (1000Hz)

Red: Gait of those who have fallen (past 1 year)
Blue: Average gait
Green: Gait of those who have never fallen (past 1 year)

Source: LIFE 2017
(September 15 - 17, 2017: Ochanomizu University)
"Relationship between kinetic characteristics of upper body trunk and lower body trunk during walking and fall risk"
National Institute of Advanced Industrial Science and Technology
Yoshiyuki Kobayashi / Miho Ono
<table>
<thead>
<tr>
<th>Item</th>
<th>Specifications</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>Sensor Model</td>
<td>MVP-RF8-KC-500</td>
<td></td>
</tr>
<tr>
<td>Acceleration detection axis</td>
<td>3 (Ax,Ay,Az)</td>
<td>axis</td>
</tr>
<tr>
<td>Acceleration detection range</td>
<td>±20 / ±60 (Switching)</td>
<td>m/sec²</td>
</tr>
<tr>
<td>Angular velocity detection axis</td>
<td>3(ωx,ωy,ωz)</td>
<td>axis</td>
</tr>
<tr>
<td>Angular velocity detection range</td>
<td>±500</td>
<td>deg/sec</td>
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<tr>
<td>A/D resolution</td>
<td>1024 (10bit)</td>
<td>LSB</td>
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<tr>
<td>Sampling period</td>
<td>5</td>
<td>msec</td>
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<tr>
<td>Wireless communication standard</td>
<td>Bluetooth 2.0 (class1)</td>
<td></td>
</tr>
<tr>
<td>Wireless communication range (reference value)</td>
<td>Approx. 30</td>
<td>m</td>
</tr>
<tr>
<td>Power source</td>
<td>Lithium ion rechargeable battery</td>
<td></td>
</tr>
<tr>
<td>Operating time (approx.)</td>
<td>10</td>
<td>hrs.</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>0 to 40</td>
<td>℃</td>
</tr>
<tr>
<td>Unit dimensions</td>
<td>W45×D45×H18</td>
<td>mm</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 60</td>
<td>g</td>
</tr>
</tbody>
</table>

※ If you are using this product in a country other than Japan, please contact us.
※ The specifications of this product may be modified without prior notice.
※ This equipment is for health care. We have not received medical device certification.

Connector for external sensors

Charge connector (microUSB)
Charge indicator LED
Power switch / Status indicator LED

Top view

Bottom view 4-M2 (Screw holes for attachments)
**Options**

- **Bluetooth-USB adapter  Parani-UD100**
  A Bluetooth antenna (recommended by MicroStone) inserted into the PC extends the communication range to a maximum of approx. 30m.

- **MVP-RF8 Harness  MVP-RF8-CBL**
  An elastic harness for attaching the main unit. For attaching the unit to the upper body.

- **MVP-RF8 Wide Belt  MVP-RF8-WBL**
  An elastic belt for attaching the main unit. Mainly for attaching the unit above the pelvis.

- **MVP-WS2 Aluminum case**
  An aluminum case measuring approximately 46 cm × 33 cm × 14 cm (Not including the handle) Holds all components of THE WALKING.
“THE WALKING” can be easily measured in a short time and can be easily introduced without specialized education!

MicroStone Corporation

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