SMART EquiTest®

Physical Dimensions

<table>
<thead>
<tr>
<th>(W x D x H)</th>
<th>in</th>
<th>cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembled dimensions</td>
<td>53</td>
<td>135 x 239</td>
</tr>
<tr>
<td>Base</td>
<td>53</td>
<td>135 x 15</td>
</tr>
<tr>
<td>System cart</td>
<td>25</td>
<td>64 x 112</td>
</tr>
<tr>
<td>Dual force plate</td>
<td>18</td>
<td>46 x 46</td>
</tr>
<tr>
<td>Step height</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Visual surround</td>
<td>42</td>
<td>107 x 188</td>
</tr>
<tr>
<td>Maximum patient height</td>
<td>80</td>
<td>203</td>
</tr>
<tr>
<td>Maximum patient weight</td>
<td>440</td>
<td>200 kg</td>
</tr>
<tr>
<td>Minimum footprint required</td>
<td>96</td>
<td>244 x 191</td>
</tr>
<tr>
<td>Minimum ceiling height</td>
<td>95</td>
<td>242</td>
</tr>
<tr>
<td>Total system weight</td>
<td>775</td>
<td>352 kg</td>
</tr>
</tbody>
</table>

*Depth extends to 64 in / 163 cm with surround in resting position.
**Minimum-maximum monitor extension height.

Components

- NeuroCom® Balance Manager® Software Suite
- Dynamic dual force plate (rotate & translate)
- Moveable visual surround with 15” LCD display and illumination
- Overhead support bar with patient harness set
- Computer with Windows operating system
- 17” LCD display
- System Cart
- Color printer and wireless mouse

Accessories Included

- Rocker board
- Step-up blocks: 4 in (10 cm) and 6 in (15 cm)
- Leveling block: 2 in (5 cm)
- Heel/toe wedges: 6° and 12° A/P
- Inversion/eversion wedges: 3° and 6° M/L
- Foam pad: 18 x 18 x 5 in (46 x 46 x 13 cm)

Electrical Characteristics

- 100-240 VAC / 50-60 Hz / 1200 Watt
- ETL listed to UL60601-1
- ETL listed to CAN/CSA No. 601.1
- Compliant to CE standards

Performance Characteristics

Rotation of the dual force plate and visual surround is controlled by independent direct current servomotors. A separate servomotor controls the horizontal translation of the force plate.

- Force plate rotation ±10°, maximum velocity 50°/sec
- Force plate translation ±2.5 in (6.35 cm) maximum velocity 6.2 in/sec (15 cm/sec)
- Visual surround rotation ±10°, maximum velocity 15°/sec

Specifications subject to change without notice.

Additional options/configurations are available. Contact NeuroCom for more information.
Standardized Assessment Protocols

Sensory Organization Test (SOT)
The SOT is a six-condition assessment providing information about interactions among the three sensory systems contributing to postural control. The SOT isolates and quantifies impairments in the patient’s use of somatosensory, visual, and vestibular inputs to balance, and impairments related to the patient’s use of specific sensory input when it is incorrect. The SOT also quantifies secondary maladaptive impairments related to the patient’s ability to select appropriate movement strategies and to accurately align their center of gravity (COG) relative to their base of support.

Motor Control Test (MCT)
The MCT assesses the ability of the automatic motor system to quickly and effectively recover following unexpected support surface disturbances. The MCT isolates and quantifies impairments in the timing and strength of the automatic response in each leg, as well as impairments in coordination of responses between the two legs and movement directions.

Adaptation Test (ADT)
The ADT is an assessment of the automatic motor system that quantifies impairments in the patient’s ability to adapt automatic responses to minimize sway when exposed to surface irregularities and unexpected changes in support surface inclination. The ADT quantifies the patient’s ability to systematically reduce their sway energy during repeated exposure to the same surface tilt disturbance.

Limits of Stability (LOS)
The LOS is an assessment of the voluntary motor system that quantifies impairments in ability to intentionally displace the COG to the patient’s stability limits without losing balance. The patient performs the task while viewing a real-time display of their COG position in relation to targets placed at the center of the base of support and at the stability limits. For each of eight directions, the test measures movement reaction time, movement velocity, movement distance, and movement directional control.

Rhythmic Weight Shift (RWS)
The RWS quantifies the patient’s ability to perform rhythmic movements of their COG from left to right and forward to backward at three distinct paces. During performance of each task, the patient views a real time display of their COG position relative to a target moving at the desired pace and amplitude. For each direction and pace, the RWS measures movement velocity and directional control.

Weight Bearing Squat (WBS)
The WBS quantifies the patient’s ability to perform squats with the knees flexed at 0°, 30°, 60°, and 90°, while maintaining equal weight on the two legs.

Unilateral Stance (US)
The US is a performance test quantifying the patient’s ability to maintain postural stability while standing on one leg at a time with the eyes open and closed. The US enhances the observational testing of single leg stance performance by providing an objective measure of patient sway velocity for each of the four task conditions.
Static Long Force Plate Option

### Physical Dimensions:

<table>
<thead>
<tr>
<th>Component</th>
<th>in (W x D x H)</th>
<th>cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual force plate</td>
<td>18 x 60 x 2</td>
<td>46 x 152 x 5</td>
</tr>
<tr>
<td>Apron:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side piece</td>
<td>8 x 60 x 2</td>
<td>20 x 152 x 5</td>
</tr>
<tr>
<td>Entry end piece</td>
<td>35 x 32 x 2</td>
<td>89 x 81 x 5</td>
</tr>
<tr>
<td>Exit end piece</td>
<td>35 x 23 x 2</td>
<td>89 x 58 x 5</td>
</tr>
<tr>
<td>Alternate exit end</td>
<td>35 x 8 x 2</td>
<td>89 x 20 x 5</td>
</tr>
<tr>
<td>Assembled dimensions</td>
<td>35 x 95-115* x 2</td>
<td>89 x 231-292* x 5</td>
</tr>
</tbody>
</table>

*Minimum-maximum depth depending on exit end piece used.

- **Maximum patient weight**: 500 lb / 227 kg
- **Minimum footprint required**: 58 x 105 / 148 x 267
- **Total weight**: 200 lb / 90 kg

### Components:

- NeuroCom® Balance Manager® software
- 60” static dual force plate
- Force plate apron

### Accessories Included (if not already supplied with base system):

- Rocker board
- Step-up blocks: 4 in (10 cm) and 6 in (15 cm)
- Leveling block: 2 in (5 cm)
- Heel/toe wedges: 6° and 12° A/P
- Inversion/eversion wedges: 3° and 6° M/L
- Foam pad: 18 x 18 x 5 in (46 x 46 x 13 cm)
- Four piece step/stair set:
  - Low step: 4 in (10 cm)
  - Medium step: 8 in (20 cm)
  - High step: 12 in (31 cm)
  - Two-step stair: 8 in (20 cm)

### Electrical Characteristics:

- 100-240 VAC / 50-60 Hz / 500 W
- ETL listed to UL60601-1
- ETL listed to CAN/CSA No. 601.1
- Compliant to CE standards

### System Requirements:

The Static Long Force Plate option requires one of the following Balance Manager® systems running software Version 8.0 or higher:

- PRO Balance Master®
- SMART Balance Master®
- EquiTest®
- SMART EquiTest®
- EquiTest® - CRS
- SMART EquiTest® - CRS

Specifications subject to change without notice.
**Standardized Assessment Protocols:**

**Limits of Stability (LOS)** The LOS is an assessment of the voluntary motor system that quantifies impairments in ability to intentionally displace the COG to the patient’s stability limits without losing balance. The patient performs the task while viewing a real-time display of their COG position in relation to targets placed at the center of the base of support and at the stability limits. For each of eight directions, the test measures movement reaction time, movement velocity, movement distance, and movement directional control.

**modified Clinical Test of Sensory Interaction on Balance (mCTSIB)** The mCTSIB is a modification of the original CTSIB that provides information about the patient’s ability to maintain postural stability under eyes open firm surface, eyes closed firm surface, eyes open on foam, and eyes closed on foam surface conditions. The mCTSIB enhances an observational test also known as the “Foam and Dome” test by providing an objective measure of patient sway velocity for each of the four task conditions.

**Rhythmic Weight Shift (RWS)** The RWS quantifies the patient’s ability to perform rhythmic movements of their COG from left to right and forward to backward at three distinct paces. During performance of each task, the patient views a real time display of their COG position relative to a target moving at the desired pace and amplitude. For each direction and pace, the RWS measures movement velocity and directional control.

**Weight Bearing Squat (WBS)** The WBS quantifies the patient’s ability to perform squats with the knees flexed at 0°, 30°, 60°, and 90°, while maintaining equal weight on the two legs.

**Unilateral Stance (US)** The US is a performance test quantifying the patient’s ability to maintain postural stability while standing on one leg at a time with the eyes open and closed. The US enhances the observational testing of single leg stance performance by providing an objective measure of patient sway velocity for each of the four task conditions.

**Sit-To-Stand (STS)** The STS is a performance test quantifying the patient’s ability, on command, to quickly rise from a seated to a standing position. The STS quantifies time required to transfer weight from the buttock to the feet (weight transfer time), the strength of the rise (rising index), the symmetry of the rising effort between the left and right legs (weight symmetry), and the COG sway velocity in the standing position.

**Walk Across (WA)** The WA is a performance test that quantifies the patient’s steady state gait while walking across the force plate. The WA enhances observational testing of gait by measuring the average width and length of the patient’s steps on the force plate, the symmetry of left and right leg step lengths, and the patient’s gait speed across the force plate.

**Tandem Walk (TW)** The TW is a performance test that quantifies the stability and speed of the patient’s gait while placing one foot directly in front of the other. The patient is instructed to walk heel to toe from one end of the force plate to the other as quickly as possible and then stop. The TW measures the average width of the patient’s steps on the force plate, the speed of the gait, and the patient’s COG sway velocity following termination of the gait.

**Step-Quick-Turn (SQT)** The SQT is a performance test that quantifies turn performance characteristics. The patient is instructed to take two forward steps on command, and then quickly turn 180° to either the left or right and return to the starting point. The SQT enhances commonly used observational tests for turn stability by measuring separately for each direction of turning, the time required to execute the turn, and the velocity of COG sway during the turn.

**Step-Up-and-Over (SUO)** The SUO is a performance test that quantifies the patient’s ability to control their body weight and postural stability while stepping up and down over a curb. The patient is instructed to step up onto a curb on command with one foot, swing the other foot over the curb while lifting the body through an erect standing position as quickly as possible, and then lower the body weight to land the swing leg as gently as possible. The SUO measures, for each leg, the strength of the rise (lift-up index), the movement time, and the impact of the swing leg landing (impact index).

**Forward Lunge (FL)** The FL is a performance test that quantifies the patient’s ability to control body weight while lunging forward with one leg. The patient is instructed to, on command, lunge/step forward onto one leg, then push backward with that leg to the original standing position. The FL measures separately for each leg, the distance of the lunge as well as the profile of the vertical force exerted by the lunging leg (force impulse) during the landing and push off phases of the maneuver.
inVision™ Option

System Requirements:
The inVision™ option requires one of the following Balance Manager® systems running software Version 8.0 or higher:
- VSR™
- BASIC Balance Master®
- Balance Master®
- PRO Balance Master®
- SMART Balance Master®
- EquiTest®
- SMART EquiTest®
- EquiTest® - CRS
- SMART EquiTest® - CRS

Components:
- Dynamic Vision software
- InterSense InertiaCube², 3-axis, integrating gyro mounted on a headband

Electrical Characteristics:
- ETL listed to UL60601-1
- ETL listed to CAN/CSA No. 601.1
- Compliant to CE standards

Specifications subject to change without notice.
inVision™ Option

inVision™ The inVision option quantifies a patient’s ability to maintain visual acuity and stable gaze while actively moving the head. The inVision package includes:

- **PERCEPTION TIME TEST (PTT)**
  Provides a baseline measurement to ensure the patient can perceive the stimuli within the time allotted in the dynamic vision test protocols.

- **DYNAMIC VISUAL ACUITY (DVA) TEST**
  Quantifies the impact of vestibular ocular reflex (VOR) impairments on a patient’s ability to accurately perceive objects while moving the head at a given velocity on a given axis.

- **GAZE STABILIZATION TEST (GST)**
  Quantifies the range of head movement velocities on a given axis over which a patient is able to maintain an acceptable level of visual acuity.

Effective image stabilization during head movement (at velocities up to 120° per second) is a key factor in performing activities of daily living. This process can be severely impacted by vestibular deficits with the ability to stabilize gaze and maintain visual acuity decreasing as the severity of a vestibular deficit increases. Image stabilization deficits are usually greater when a patient is moving the head toward the more severely impaired ear, particularly in the presence of a unilateral peripheral loss. Thus, the assessment of a patient’s ability to perform visual tasks requiring image stabilization are considered complementary to physiological tests of the VOR system.

<table>
<thead>
<tr>
<th>DYNAMIC VISUAL ACUITY (DVA) TEST</th>
<th>GAZE STABILIZATION TEST (GST)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Quantifies the extent of visual acuity loss due to the combined influences of underlying vestibular pathology and adaptive responses on image stabilization.</td>
<td>• Provides impairment information specific to the direction and velocity of head movements impacting gaze stabilization.</td>
</tr>
<tr>
<td>• Provides information relative to the probable side of lesion in a patient with a suspected unilateral peripheral vestibular deficit. An approach complementary to nystagmography.</td>
<td>• Quantifies the velocity range over which VOR compensation is effective for a given head movement.</td>
</tr>
<tr>
<td>• Helps clinicians identify those patients most likely to benefit from vestibular rehabilitation and to focus rehabilitation exercises accordingly.</td>
<td>• Helps target treatment by demonstrating the specific direction(s) and velocity of head movements most likely to achieve the maximum benefit.</td>
</tr>
<tr>
<td>• As a direct indication of impairment, the DVA is an excellent objective measure of the outcome of vestibular rehabilitation.</td>
<td>• Aids in determining disability ratings by comparing the head movements over which gaze stabilization can be maintained relative to movements required by the daily life task.</td>
</tr>
</tbody>
</table>
Head Shake - Sensory Organization Test (HS-SOT)

System Requirements:
The HS-SOT option requires one of the following Balance Manager® systems running software Version 8.0 or higher:
- PRO Balance Master®
- SMART Balance Master®
- EquiTest®
- SMART EquiTest®
- EquiTest® - CRS
- SMART EquiTest® - CRS

Components:
- HS-SOT software
- InterSense InertiaCube², 3-axis, integrating gyro mounted on a headband

Electrical Characteristics:
- ETL listed to UL60601-1
- ETL listed to CAN/CSA No. 601.1
- Compliant to CE standards

Specifications subject to change without notice.
Head Shake - Sensory Organization Test (HS-SOT)

The HS-SOT identifies impairments in a patient’s effective use of the vestibular inputs required to maintain balance during complex task conditions.

**Normal test:** patient experienced a minimal 10% decline in balance control with maximum vestibular challenge in the horizontal plane.

**Abnormal performance:** a total loss of balance control with vertical head movement.

Normal balance function in the horizontal movement plane of the head shake protocol.

Impaired function (falls) with head movement in the vertical movement plane of the head shake protocol.