Instruction Manual

OLYMPIC SMART SCALE®

Model 50/51

CAUTION

Read and be familiar with this manual before installing, operating, or servicing this device. To ensure operator, technician, and patient safety, use only as specified in this manual.
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Overview

This manual provides the necessary information to install, maintain, and service the Olympic Smart Scale® Model 50/51. The operating instructions in this manual are intended for use under the direct supervision of a licensed medical practitioner. The installation and service instructions in this manual are intended for use by qualified service technicians.

Conventions

The following conventions are used in this manual.

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTE</td>
<td>Notes provide additional information to clarify a point in the text.</td>
</tr>
<tr>
<td>CAUTION</td>
<td>Cautions indicate situations that, if not avoided, could result in minor to moderate injury to the patient or operator, or damage to the equipment.</td>
</tr>
<tr>
<td>WARNING</td>
<td>Warnings indicate situations that, if not avoided, could result in serious injury or death to the patient or operator.</td>
</tr>
<tr>
<td>BUTTON</td>
<td>This character style represents buttons and controls that the user can touch or press.</td>
</tr>
</tbody>
</table>
Symbols

The following symbols are located on the Olympic Smart Scale and its packaging.

### Table 1.2 Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>❄️</td>
<td>Alternating current (ac) voltage</td>
<td>☇️</td>
<td>Nonionizing electromagnetic radiation</td>
</tr>
<tr>
<td>🌡️</td>
<td>Atmospheric pressure</td>
<td>⚡️</td>
<td>Protective earth (ground)</td>
</tr>
<tr>
<td>⚠️</td>
<td>Caution, read instructions</td>
<td>📦</td>
<td>Rechargeable battery</td>
</tr>
<tr>
<td>⚡️</td>
<td>Electrical shock hazard</td>
<td>📦</td>
<td>Shipping</td>
</tr>
<tr>
<td>⚡️</td>
<td>Fuse</td>
<td>📦</td>
<td>Storage</td>
</tr>
<tr>
<td>🌡️</td>
<td>Humidity, condensing</td>
<td>🌡️</td>
<td>Temperature</td>
</tr>
<tr>
<td>🌡️</td>
<td>Line (hot conductor)</td>
<td>🌡️</td>
<td>Type B equipment</td>
</tr>
<tr>
<td>🌡️</td>
<td>Neutral (neutral conductor)</td>
<td>🌡️</td>
<td>Legal manufacturer</td>
</tr>
</tbody>
</table>
**Intended Use**

The Olympic Smart Scale® Model 50/51 is intended for weighing infants and children up to 55 lb (25 kg).

**Description**

The Olympic Smart Scale Model 50/51 is a scale that quickly and safely weighs pediatric patients, from infants to toddlers. It features folding ends to easily accommodate the patient (see Figure 1.2). The scale operates on rechargeable batteries or power from a hospital-grade electrical outlet.

The Model 50 is a table-top model, while the Model 51 roll-around model comes attached to a cart (mobile base), which makes it the perfect height for use with all models of Olympic Warm-Lamps.

**Figure 1.1** Smart Scale Model 50/51

**Figure 1.2** Folding ends accommodate the patient
Description

Controls and Status Lights

Figure 1.3  Controls and status lights

Control Buttons

1. **ON/OFF (Display).** Turn the scale display on or off.

   **NOTE** If operating on batteries, the scale automatically turns off after three minutes of inactivity.

2. **ZERO.** Cancels (tares out) the weight of any objects (e.g., blankets, toys) on the weighing platform; use before placing the patient on the platform.

3. **KG/LB.** Changes the display between measurement units of pounds-ounces and kilograms.

4. **AVERAGE/UNLOCK.** Calculates a four-second average of an active patient’s weight and locks it on the display. Press again to unlock the display.

5. **RECALL.** Displays the last locked weight after the display has turned off.

   **NOTE** RECALL only operates when the scale display is off. The scale display automatically turns off after 10 seconds of inactivity.

Status Lights

6. **LOCKED (green).** The patient’s average weight is locked on the display. The weight shown will remain on the display when the patient is removed from scale.

7. **AVERAGING (yellow).** The scale is computing a four-second average of the patient’s weight. Avoid touching the patient and platform while the AVERAGING light is flashing.

   **CAUTION** Touching the platform or patient while the AVERAGING light is blinking can result in an incorrect weight (see Weight Lock/Unlock (AVERAGE/UNLOCK) on page 3-4).

8. **OVERLOAD.** The weight on the platform exceeds 55 lb (25 kg).

9. **LO BAT.** Indicates low or depleted battery charge. Lit and steady means that approximately 30 minutes of battery life remain. Blinking means that the battery charge is depleted, and the scale will automatically shut off. If this indicator is lit or blinking, plug the scale into an electrical outlet to recharge the battery (see page 4-2).
**CHARGING.** The batteries are charging. The scale can be used while the batteries are charging.

**Averaging the Weight of an Active Patient**

The Olympic Smart Scale detects movement and accurately calculates the weight of an active, moving child. When weight-force is applied to the tray, electronic signals from the load cells are processed by a series of electronic filters and a microprocessor that detect motion and calculate an averaged weight.

Weight is sampled at 16 Hz (16 samples per second). Every six samples are averaged to produce one reading. In normal operating mode, this reading is shown on the display.

When **AVERAGE/UNLOCK** is pressed, an electronic smoothing filter is activated and each reading (six sample average) is compared to the previous reading. If the reading is within ±200 g, it is averaged with the previous reading. If eight consecutive readings are within ±200 g, the weight locks on the display. If, after sixteen readings, eight readings are not within ±200 g, the scale locks the last average on the display. This process occurs in just four to six seconds.

To assure accuracy, Natus Medical determined the design parameters for calculating averaged weight by weighing active infants on a special platform using a strip chart recorder to measure the dynamic forces generated by the infant’s weights and movements. The software program for weight-averaging was then verified by further extensive testing in nurseries.

With its sophisticated weight-averaging techniques, the Model 50/51 can weigh a moving infant to an accuracy of 20–40 grams.
Description
Installation

The Smart Scale requires minimal handling during unpacking and installation.

The scale is heavy and awkward; two people should lift the scale. To pick it up, firmly grasp the bottom of the scale; never attempt to lift the scale by its sides.

To install the Smart Scale Model 50:

- Before using the scale, remove and discard the green protective display cover.
- Place the scale on a sturdy, flat, level table or countertop.

Ensure that the scale is away from the edge so that it cannot slide or “walk” off the table or countertop.

- Attach the scale to a mobile cart or table: Four threaded (10-32 UNF) holes are provided in the base plate of the scale for bolting it to a cart or table (see Figure 2.2). The scale’s rubber feet may remain attached.

If using the scale on a cart, securely anchor the scale to the cart. Confirm that the cart/scale combination is stable at 10° of tilt with 25 kg weight on a platform end in its down position.

Locking Units to Kilograms (optional)

The standard configuration of the scale allows you to toggle the units of measurement between metric and English (kilograms and pounds). You can permanently lock the units to measure kilograms only.

CAUTION
- Only qualified technicians should assemble this device.
- Read and be familiar with this instruction manual before assembling this device.

WARNING
Electrical shock hazard when the enclosure is open. Unplug the power cord from the electrical outlet when installing this device.
To permanently lock the units to kilograms:

1. Press ON/OFF on the front panel to turn on the scale.
2. Press KG/LB until kilograms are selected.
3. Press ON/OFF to turn off the scale.
4. Lift and turn over the scale to gain access to the KG/LB disabling switch. With the scale oriented as shown in Figure 2.1, you can access the switch through the 3/8” hole on the right side of the bottom of the scale.

Figure 2.1  Bottom of Smart Scale — KG/LB disabling switch

5. Flip the KG/LB disabling switch to the left.
6. Press ON/OFF to turn on the scale. The units are now locked to kilograms.
7. Press KG/LB to verify that the units are locked to kilograms. If locked, the display should still show kilograms.
8. Place the Locked to KILOGRAMS label over the KG/LB switch.

Attaching the Smart Scale to Its Cart (Mobile Base)

NOTE  Natus Medical manufactures a cart (mobile base) for the Smart Scale Model 50. The Model 51 is the Smart Scale Model 50 with this cart.

CAUTION  Before using the scale on a cart, securely attach the Smart Scale to the cart as described in the following instructions.

Required Items:

- Smart Scale
- Cart (mobile base)
- Probe
- Mounting hardware

NOTE  The mounting hardware (four #10-32 screws, washers, and nylon spacers) and caution label is taped to the inside of the cart.
To attach the scale on the cart:

1. Place the scale on top of the cart, then open the cabinet door of the mobile base.

2. Using the probe, align the four threaded holes in the scale (see Figure 2.2) with the four mounting holes in the top of the cart (see Figure 2.3).

3. Inside the cart, place the washers on the mounting screws, then insert the mounting screws through the mounting holes in the cart (see Figure 2.3) and tighten until the scale is securely attached.

4. Remove the backing from the caution label, which is included with the mounting hardware, then press the label above the “Summary Instructions” on the back panel of the scale (see Figure 2.3).

Figure 2.2  Bottom of Smart Scale — threaded holes

Figure 2.3  Installing the scale on the base
Before First Use

Initial Battery Charge
The Smart Scale has internal rechargeable batteries that automatically charge whenever the scale is plugged into an electrical outlet. Before operating the scale on its batteries for the first time, charge the batteries for approximately 2.5 hours to reach full charge. The scale can be used while the batteries are charging. For more information, see page 4-2.

Calibration Check
The scale was calibrated before shipment. However, due to local variations in the force of gravity, which can affect calibration by as much as 20 g, recalibrate the scale before use (see page 4-3).
Testing the Device

Perform the test procedure to ensure the Smart Scale is working properly after performing assembly and service procedures.

**Required Items:**
- Calibration weights (part no. 56357)

**To test the Smart Scale:**

1. Press and hold **KG/LB** while pressing **ON/OFF**.
2. Verify that all lights illuminate.
3. Place the calibration weights on the scale, then confirm that the correct weight displays.
4. Press **ON/OFF** to turn off the scale.

**NOTE**

The charging signal only illuminates when the scale is plugged into a functioning electrical outlet.

If the device does not operate as expected, see *Troubleshooting* on page 5-1.
Testing the Device
Operation

Operating the Smart Scale

To operate the Smart Scale:

1. Press ON/OFF to turn on the scale.
   A series of moving dashes appear on the display. Next, the 0 weight reading appears, indicating the scale has automatically found its zero reference point.
2. If mounted on a cart, lock the caster wheels (for the Model 51, see page 3-2).
3. Adjust the platform ends, as appropriate (see page 3-3).
4  Place the patient on the platform:

- For still patients, the weight automatically displays. Read and record the weight.
- For active patients, press **AVERAGE/UNLOCK** to average the weight and lock it on the display. Read and record the weight, then press **AVERAGE/UNLOCK** to unlock the display.

**NOTE**

For information on averaging the weight of an active patient, changing the display units, and canceling the weight of objects (e.g., blankets), see page 3-4.

**CAUTION**

- Always watch the patient while on the weighing platform; to avoid injury, prevent the patient from crawling off of the weighing platform.
- Always clean/disinfect the scale between patients.

### Setting the Caster Brakes

**To set or release the brakes:**

- Step on the left side of the brake lever to set the brake; step on the opposite side to release the brake (see Figure 3.1). There are two locking casters on the Model 51 cart.

**CAUTION**

Always lock the wheel casters before placing the patient in the scale.

*Figure 3.1  Setting the caster brake*

![Figure 3.1](image-url)
Adjusting the Platform Ends

To adjust the platform ends:

- While holding the platform end press the large red button labeled **PUSH TO UNLATCH** (see Figure 3.2), then gently lower the platform end to the full-down position.

Lower one or both ends to accommodate the patient being weighed. Whenever possible, at least one platform end should remain up to help confine the patient.

**NOTE**

- Keep the platform ends in either the full-down or full-up positions. Ends are locked in the full-up position only when **LATCHED** appears (see Figure 3.3).
- Do not allow the patient to sit or stand on the platform ends.

- To return an end to the full-up position, lift the end until it locks into place and **LATCHED** appears on the button’s rim (see Figure 3.3).

**CAUTION**

- To return an end to the full-up position, lift the end until it locks into place and **LATCHED** appears on the button’s rim (see Figure 3.3).

Figure 3.2 Adjusting the platform ends

Figure 3.3 Locking the ends into position
Weighing the Patient

Always clean/disinfect the scale between patients.

**Kilograms/Pounds-Ounces**

When the scale is first turned on, it shows the weight in the last-used units. To change the display weight, press KG/LB. Kilograms display to 0.02 kg.

This scale has an option to permanently lock the measurement units to kilograms (see Locking Units to Kilograms (optional) on page 2-1).

**Zeroing the Weight of Objects**

The weight of objects, such as blankets, can be zeroed (i.e., tared out, canceled) to ensure that the patient weight is accurate.

**To tare a weight:**

- If the scale is on, place the object on platform, then press ZERO.
- If the scale is off, place the object on the platform, then press ON/OFF.

When the weight of the object is zeroed, the display shows 0.

If the object is removed from the platform after its weight has been zeroed, the scale shows a negative weight. Press ZERO to re-zero the scale.

When an object is on the platform and the display shows 0, its weight has been zeroed. If a patient is then placed on the platform, only the patient’s weight will display.

**Patient Still, Not Moving**

If the patient remains still, the weight appears on the display.

**Patient Active, Moving**

If the patient is active and the weight shown changes rapidly, press AVERAGE/UNLOCK. The AVERAGING light blinks while the Smart Scale averages the patient’s weight over four seconds. When the averaged weight is computed, the LOCKED light illuminates and the weight locks on the display.

Touching the platform or patient while the AVERAGING light is blinking can result in an incorrect weight; see Weight Lock/Unlock (AVERAGE/UNLOCK).

**Weight Lock/Unlock (AVERAGE/UNLOCK)**

When the LOCKED light illuminates, the weight remains locked on the display. Press AVERAGE/UNLOCK to unlock the display, or turn off the scale if weighing is complete.

If the scale is touched during averaging:

1. Wait for the LOCKED light to illuminate.
2 Press AVERAGE/UNLOCK to unlock the display.

3 Press AVERAGE/UNLOCK to recalculate and display the patient’s weight.

Recalling the Last Locked Weight
If the Smart Scale is turned off or loses power, press RECALL to display the last locked-in weight. The scale display will come on, display the last locked weight for 10 seconds, and then turn off.

NOTE

The weight can only be recalled when the display has turned off.

Weighing the Next Patient
Before weighing the next patient, the scale display must show 0. If the display is locked (LOCKED light illuminates), press AVERAGE/UNLOCK. The scale should show 0; if not, press ZERO.

CAUTION

Always clean/disinfect the scale between patients.

Overload
If the load exceeds 55 lb (25 kg), the OVERLOAD light illuminates and blinks, indicating that the weight on the scale platform is too heavy. Remove extra objects, or the patient, from the scale.
Operating the Smart Scale
Maintenance

Cleaning the Smart Scale

Required Items:
- Soft cleaning cloths
- Mild cleaning detergent (e.g., Virex™ Tb, Virustat®, Coverage®) or mild soap-and-water solution
- Disinfectant (e.g., Sporicidin®)

To clean the Smart Scale:

1. If the scale is on, press ON/OFF to turn off the scale, then unplug the power cord.

2. Dampen the cleaning cloth with either the mild soap-and-water solution or the liquid disinfectant, then wipe down all exterior surfaces of the Smart Scale. Use the second cloth to dry all exterior surfaces of the Smart Scale.
Charging the Battery

The Smart Scale has internal rechargeable batteries that automatically charge (CHARGING signal illuminates) whenever the scale is connected to a functioning electrical outlet.

**CAUTION**

Connect this device directly to a properly grounded hospital-grade outlet.

- Partially discharging and recharging the rechargeable batteries repeatedly over time will lead to premature battery failure. To prolong battery health, occasionally run the scale on battery power alone until the cells are fully discharged, then fully recharge the battery for 2.5 hours.
- Charge new batteries for approximately 2.5 hours to reach full charge before operating the Smart Scale on battery power.
- Batteries can be continuously charged without damage.
- The scale can be used while the batteries are charging.

To recharge the battery:

- Plug the power cord into a hospital-grade electrical outlet. Allow the battery to recharge for at least 2.5 hours.

**Battery Charge Life**

When fully charged, the scale will operate for approximately three hours of continuous use—enough battery power for about 100 weighings.

**Low Battery (LO BAT)**

The LO BAT signal indicates how much battery life remains:

- If slowly blinking, the battery is getting low.
- If lit and steady, approximately 30 minutes of continuous battery-powered operation time remains.
- If rapidly blinking, the battery charge has been depleted and the scale will automatically turn off. Connect the scale to a functioning electrical wall outlet for recharging.

When LO BAT appears, connect the scale to an electrical outlet to recharge the battery.
Calibrating the Smart Scale

As with any precision electronic instrument, the scale can drift out of calibration over time. Calibrate the Smart Scale before first use and every six months.

Required Items:
- Calibration weights (part no. 56357)

To calibrate the Smart Scale:

1. Place the scale on a firm, level surface and protect it from moving air. Confirm that the ambient temperature is 70–75°F (21.1–23.9°C).

2. Press and hold ZERO, then press ON/OFF to enter calibration mode (see Figure 4.1); confirm the following:
   - The current software version (e.g., CAL 1.0) appears.
   - C 0 appears while the scale captures the zero point.
   - C 12500 appears prompting for placement of the 12.5 kg calibration weight.

3. Place the two calibration weights (totaling 12,500 grams) on the center of the platform. Calibration is successfully completed when 12.50 kg displays (see Figure 4.1).

Figure 4.1 Calibration mode displays

- 1) Displaying the software version
- 2) Capturing the zero point
- 3) Requesting the calibration weight
- 4) Displaying the weight of the calibration weight

4. Remove the calibration weight from the scale, then press ZERO.

5. Press ON/OFF to turn off the scale.
Calibrating the Smart Scale
Troubleshooting

Should you experience difficulty when operating your Smart Scale, consult the following table. For problems not listed in the table, contact Natus Medical (see page 5-4).

Table 5.1  Troubleshooting chart

<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale won’t turn on</td>
<td>No power</td>
<td>Make sure the power cord is plugged in.</td>
</tr>
<tr>
<td></td>
<td>Depleted battery</td>
<td>Plug the device into an electrical outlet and allow the battery to charge for 2.5 hours. If the battery doesn’t charge, replace the battery pack (see page 6-7).</td>
</tr>
<tr>
<td></td>
<td>Blown fuse(s)</td>
<td>Replace the fuse(s) (see page 6-5).</td>
</tr>
<tr>
<td>Damaged membrane control panel</td>
<td>Test the membrane control panel (see page 6-8).</td>
<td></td>
</tr>
<tr>
<td>Damaged power supply printed circuit board (PCB)</td>
<td>Test the power supply PCB (see page 6-9); replace if necessary (see page 6-12).</td>
<td></td>
</tr>
<tr>
<td>Damaged display PCB</td>
<td>Test the display PCB (see page 6-9); replace if necessary (see page 6-12).</td>
<td></td>
</tr>
<tr>
<td>Damaged display panel cable</td>
<td>Test the display panel cable (see page 6-9).</td>
<td></td>
</tr>
<tr>
<td>Main PCB U11 goes “logic low” when ON/OFF is pressed</td>
<td>Replace the main PCB (see page 6-12).</td>
<td></td>
</tr>
<tr>
<td>KG/LB won’t change measurement units</td>
<td>KG/LB disabling switch is active</td>
<td>Deactivate the KG/LB disabling switch (see Locking Units to Kilograms (optional) on page 2-1).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: Some facilities activate this switch so the display will only show kilograms. Check your facility’s guidelines before deactivating the switch.</td>
</tr>
<tr>
<td></td>
<td>Damaged membrane switch panel</td>
<td>Test the membrane switch panel (see page 6-8).</td>
</tr>
<tr>
<td></td>
<td>Damaged display panel cable</td>
<td>Test the display panel cable (see page 6-9).</td>
</tr>
<tr>
<td></td>
<td>Damaged main PCB</td>
<td>Test the main PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
<tr>
<td>Problem</td>
<td>Probable Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Incorrect or inaccurate weight</td>
<td>Incorrect unit of measurement</td>
<td>Press KG/LB to change unit of measurement.</td>
</tr>
<tr>
<td></td>
<td>Object rubbing against weighing platform or platform assembly</td>
<td>Check the weighing platform for objects (e.g., power cord, blankets) rubbing against it; remove the objects. Remove the platform assembly and check for objects (e.g., cables, enclosure) interfering with the weighing platform.</td>
</tr>
<tr>
<td></td>
<td>Out of calibration</td>
<td>Calibrate the scale (see page 4-3).</td>
</tr>
<tr>
<td></td>
<td>Wrong value weight used for calibration</td>
<td>Use the appropriate value weight when calibrating the scale (see page 4-3).</td>
</tr>
<tr>
<td></td>
<td>Improper calibration technique</td>
<td>Use proper techniques when calibrating the scale (see page 4-3).</td>
</tr>
<tr>
<td></td>
<td>Electromagnetic interference</td>
<td>Check for electromagnetic interference (see page 8-4).</td>
</tr>
<tr>
<td></td>
<td>Damaged load cell</td>
<td>Contact Natus Medical (see page 5-4).</td>
</tr>
<tr>
<td></td>
<td>Damaged main PCB</td>
<td>Test the main PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
<tr>
<td>Dashes “walk” across display but scale won’t show 0</td>
<td>Out of calibration</td>
<td>Calibrate the scale (see page 4-3).</td>
</tr>
<tr>
<td></td>
<td>Damaged load cell</td>
<td>Contact Natus Medical (see page 5-4).</td>
</tr>
<tr>
<td></td>
<td>Signal beyond zero capture range or unstable</td>
<td>With the platform on the scale, place the scale in counts mode (see page 6-12). The counts shown must be between 9000 and 13500. If it is out of range, contact Natus Medical (see page 5-4). With the platform on the scale, place the scale in counts mode (see page 6-12). If the shown counts fluctuate more than ±4, contact Natus Medical (see page 5-4).</td>
</tr>
<tr>
<td>CHARGING doesn’t light when scale is plugged into electrical outlet</td>
<td>Blown fuse(s)</td>
<td>Replace the fuse(s) (see page 6-5).</td>
</tr>
<tr>
<td></td>
<td>Battery pack isn’t connected</td>
<td>Check the battery pack connection.</td>
</tr>
<tr>
<td></td>
<td>Damaged battery</td>
<td>Test the battery pack to determine if it is at 8.4V when fully charged. If not, replace the battery pack (see page 6-7).</td>
</tr>
<tr>
<td></td>
<td>Damaged main PCB</td>
<td>Test the main PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
<tr>
<td></td>
<td>Damaged power supply PCB</td>
<td>Test the power supply PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
<tr>
<td></td>
<td>Damaged display PCB</td>
<td>Test the display PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
</tbody>
</table>
### Table 5.1 Troubleshooting chart, continued

<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHARGING</strong> lights, but scale won’t operate on battery power</td>
<td>Depleted battery</td>
<td>Plug the device into an electrical outlet and allow the battery to charge for 2.5 hours. If the battery doesn’t charge, replace the battery pack (see page 6-7).</td>
</tr>
<tr>
<td></td>
<td>Damaged battery</td>
<td>Test the battery pack to determine if it is at 8.4V when fully charged. If not, replace the battery pack (see page 6-7).</td>
</tr>
<tr>
<td></td>
<td>Power supply PCB damaged</td>
<td>Replace the power supply PCB (see page 6-9).</td>
</tr>
<tr>
<td><strong>LOCK/AVERAGE</strong> won’t lock or average weight</td>
<td>Damaged membrane switch panel</td>
<td>Test the membrane switch panel (see page 6-8).</td>
</tr>
<tr>
<td></td>
<td>Damaged display panel cable</td>
<td>Test the display panel cable (see page 6-9).</td>
</tr>
<tr>
<td></td>
<td>Damaged main PCB</td>
<td>Test the main PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
<tr>
<td><strong>ZERO</strong> won’t zero object on scale</td>
<td>Objects not on scale</td>
<td>Place the objects (e.g., blankets, toys) on the scale, then press <strong>ZERO</strong> to cancel their weight. Next, add the patient to the scale and read the weight.</td>
</tr>
<tr>
<td></td>
<td>Damaged membrane switch panel</td>
<td>Test the membrane switch panel (see page 6-8).</td>
</tr>
<tr>
<td></td>
<td>Damaged display panel cable</td>
<td>Test the display panel cable (see page 6-9).</td>
</tr>
<tr>
<td></td>
<td>Damaged main PCB</td>
<td>Test the main PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
<tr>
<td>Scale won’t lock weight on display and <strong>LOCKED</strong> doesn’t illuminate</td>
<td>Damaged main PCB</td>
<td>Test the main PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
<tr>
<td><strong>RECALL</strong> won’t display last locked weight</td>
<td>Scale display on</td>
<td><strong>RECALL</strong> only operates when the scale display is off.</td>
</tr>
<tr>
<td></td>
<td>Damaged membrane switch panel</td>
<td>Test the membrane switch panel (see page 6-8).</td>
</tr>
<tr>
<td></td>
<td>Damaged display panel cable</td>
<td>Test the display panel cable (see page 6-9).</td>
</tr>
<tr>
<td></td>
<td>Damaged main PCB</td>
<td>Test the main PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
<tr>
<td><strong>RECALL</strong> always shows zero</td>
<td>Damaged main PCB</td>
<td>Test the main PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
<tr>
<td>Scale won’t calibrate; stops at C 0</td>
<td>Object on platform</td>
<td>Ensure that no objects (e.g., weight) are on the scale.</td>
</tr>
<tr>
<td></td>
<td>Excess vibration</td>
<td>Place the scale on a stable surface.</td>
</tr>
<tr>
<td></td>
<td>Damaged load cell</td>
<td>Contact Natus Medical (see page 5-4).</td>
</tr>
<tr>
<td>Scale won’t calibrate; stops at C 12500</td>
<td>Incorrect calibration weight</td>
<td>Use an NIST traceable 12.5-kg weight.</td>
</tr>
<tr>
<td></td>
<td>Excess vibration</td>
<td>Place the scale on a stable surface.</td>
</tr>
<tr>
<td></td>
<td>Damaged load cell</td>
<td>Contact Natus Medical (see page 5-4).</td>
</tr>
<tr>
<td><strong>Error code E901</strong> (Cal Error)</td>
<td>Counts out of allowable capture window</td>
<td>Calibrate the scale (see page 4-3).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Possible load cell failure; contact Natus Medical (see page 5-4).</td>
</tr>
</tbody>
</table>
### Technical Support

For technical support, contact Natus Medical at:

- Toll-free: 1-866-940-7143 (US/Canada)
- Phone: +1-206-767-3500 (international)
- Fax: +1-206-767-0573
- Email: Seattle_technical_service@natus.com

### Table 5.1  Troubleshooting chart, continued

<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error code E905 (Check Sum Error)</td>
<td>Non-volatile memory corrupted or damaged</td>
<td>Calibrate the scale (see page 4-3).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test the main PCB (see page 6-9); replace if necessary (see page 6-12).</td>
</tr>
<tr>
<td>Unreadable display/garbled</td>
<td>Electrical fast transient bursts</td>
<td>Install a filter on power input lines. Contact Natus Medical (see page 5-4).</td>
</tr>
</tbody>
</table>


Section 6

Service

**WARNING**

Electrical shock hazard when the enclosure is open. Unplug the power cord from the electrical outlet before servicing this device. Whenever power is required for testing, use battery power.

**CAUTION**

- Only qualified technicians should perform service procedures.
- Read and be familiar with this instruction manual before servicing this device.
- Reattach all ground wires after servicing to ensure proper grounding.
- The printed circuit boards (PCBs) contain static sensitive parts. Always use appropriate electrostatic discharge protection, such as an electrical-grounding wrist strap, when working with internal components.
- Always recalibrate the Smart Scale after disassembly/reassembly (see page 4-3).

**Repair Policy**

Do not use malfunctioning equipment. To promote product reliability, a qualified technician may perform the replacement and service procedures described in this section. Before servicing your equipment, check your equipment warranty status, check the normal repair procedures for your facility, and determine the appropriate repair procedure to perform.

To ensure performance to factory specifications, it is recommended that all replacement parts be those either manufactured or sold by Natus Medical. After all repair actions and tests are complete, perform the pre-operative test procedure in this manual (see page 2-5) to ensure proper operation and compliance with published specifications.

**Printed Circuit Boards**

Observe proper handling cautions at all times. The integrated circuits and semiconductors on the printed circuit boards (PCBs) can be damaged by electrostatic discharge or contamination by body oil. Return the Smart Scale to Natus Medical for repair or replacement of faulty PCBs.
Repair Procedures

Consult the troubleshooting chart (see page 5-1) to identify probable causes and solutions before performing repair procedures.

**WARNING**

Electrical shock hazard when the enclosure is open. Unplug the power cord from the electrical outlet before servicing this device.

- Reattach all ground wires after servicing to ensure proper grounding.
- Note the location of the lock washers when disassembling the device. To ensure ground integrity, reseat all washers when reassembling the device.
- Printed circuit boards (PCBs) contain static-sensitive parts. Always use appropriate electro-static device (ESD) protection when the enclosure is removed.
- Always recalibrate the Smart Scale after disassembly/reassembly (see page 4-3).

**Disassembling the Smart Scale**

It may be necessary to disassemble the Smart Scale to perform a service procedure.

**Required Items:**

- Allen wrench

**To disassemble the scale:**

1. If the scale is on, press ON/OFF to turn off the scale, then unplug the power cord.
2. If the scale is mounted to a cart or table, remove it.
3. Remove the cap screws (see Figure 6.1):
   a. Slide one end of the scale just over the edge of a table.
   b. Unscrew the four socket-head cap screws.
   c. Repeat steps a and b on the other end.

![Figure 6.1 Accessing the socket-head cap screws](image)

4. Lift the platform assembly up to expose the weighing platform (see Figure 6.3).

**NOTE**

The platform assembly, with its hinged ends, cannot be repaired in the field and should not be disassembled. If it is damaged, return it to Natus Medical for repair or replacement.
5 Remove the weighing platform:
   a  Remove the two socket head cap screws and the two flat head cap screws (see Figure 6.2).
   b  Lift the weighing platform to expose the PCBs (see Figure 6.3).
   c  Place the spacer in a safe location.

Figure 6.2  Exposing the weighing platform

Figure 6.3  Exposing the PCBs
Reassembling the Smart Scale

After performing a service procedure, reassemble the Smart Scale and verify that it operates correctly before use.

Required Items:

- Allen wrench

To reassemble to scale:

1  Attach the weighing platform:

When reinstalling the weighing platform, confirm that the channel connected to the right load cell is square and that the swing arms move freely.

a  Place the spacer on the base (see Figure 6.3).

b  Place the weighing platform on the base, then secure with the two socket-head cap screws and the two flat-head cap screws.

   - Apply 90-in.–lb. torque to the two socket-head cap screws.
   - Tighten the two flat-head cap screws firmly; these screws require minimal force to secure.

c  Slide one end of the scale so that it hangs over the edge of the table, then secure the four socket-head cap screws underneath the device.

   - Apply 5-in.–lb. ±1 torque to the cap screws that attach the main platform to the chassis.

d  Repeat step c on the other end.

2  Calibrate the scale (see page 4-3).

CAUTION

Always recalibrate the Smart Scale after disassembly/reassembly (see page 4-3).
Replacing the Fuses
If the device does not function when the power cord is plugged in and the power is turned on, a fuse may be blown. The Smart Scale has two fuse locations—one accessible by disassembly and two accessible from the back of the device.

Main Fuses

Required parts:
- Main fuses, x2 (part no. 200021)

To replace the main fuses:

1. If the scale is on, press ON/OFF to turn off the scale, then unplug the power cord.
2. Remove the fuses (see Figure 6.4):
   a. Locate the fuse cover caps of the main fuses.
   b. Push in and turn the fuse cover caps, then pull the caps and fuses out of the scale.
3. Insert the new fuses: Place the new fuses into the fuse cover caps, then turn to secure.

Figure 6.4  Replacing the main fuses
Internal Fuse

Required parts:
- Pico fuse, x1 (part no. 200021)
- ESD protection
- Allen wrench
- Solder gun and solder

To replace the pico fuse:
1. If the scale is on, press ON/OFF to turn off the scale, then unplug the power cord.
2. Disassemble the scale (see page 6-2).
3. Remove the pico fuse:
   a. Remove the power supply PCB (see page 6-8); the pico fuse is located on the power supply PCB.
   b. Carefully unsolder the fuse, then remove the fuse.
4. Insert the new fuse: Solder the new pico fuse into position F1 on the power supply PCB.
5. Reassemble and calibrate the scale (see page 6-4, then page 4-3).
Replacing the Battery Pack

If the battery pack no longer holds its charge, replace it.

NOTE

Partially discharging and recharging the rechargeable batteries repeatedly over time will lead to premature battery failure. To prolong battery health, occasionally run the scale on battery power alone until the cells are fully discharged, then fully recharge the battery for 2.5 hours.

Required parts:

- Battery pack (part no. 401391)
- Screwdriver

WARNING

Only use the replacement Olympic Battery Pack (part no. 401391). Use of an incorrect battery pack may cause equipment damage, explosion, or fire.

To replace the battery pack:

1  If the scale is on, press ON/OFF to turn off the scale, then unplug the power cord.

2  Loosen the two screws that secure the battery compartment cover to the back of the scale, disconnect the battery connection, then remove the battery pack (see Figure 6.5).

Figure 6.5  Replacing the battery pack

3  Place the new battery in the compartment, then connect battery connector.

4  Place the battery compartment cover into position, then gently tighten its screws.

5  Connect the power cord to an electrical outlet. The CHARGING light will illuminate.

NOTE

Charge new batteries for approximately 2.5 hours to reach full charge before operating the Smart Scale on battery power.

6  Properly dispose of the nickel-cadmium (Ni-Cad) battery. The internal battery pack can be recycled by contacting the Rechargeable Battery Recycling Corporation (RBRC) at 1-800-822-8837 or www.rbrc.org. If the battery pack is not recycled, it must be disposed of as Hazardous Waste.
Testing the Membrane Switch Panel
Test the membrane switch panel if the AVERAGE/UNLOCK, KG/LB, or ZERO do not function.

Required Items:
- Allen wrench
- ESD protection
- Jumper wires (x2)
- Voltmeter

To test the membrane switch panel:

1. If the scale is on, press ON/OFF to turn off the scale, then unplug the power cord.
2. Disassemble the scale (see page 6-2).
3. Disconnect the ribbon cable connector from the display PCB (see Figure 6.6).

To test the membrane switch panel:

4. Verify that the membrane switch panel is properly connected.

NOTE
If the KG/LB disabling switch has been activated (see page 2-1), KG/LB will be disabled and the scale will only display kilograms.

5. Using two small jumper wires, check the resistance of the malfunctioning switch at the corresponding pin on J2 of the display PCB (see Table 6.1).

<table>
<thead>
<tr>
<th>Switch</th>
<th>J2 pin on display PCB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common (ground)</td>
<td>5, 6</td>
</tr>
<tr>
<td>Zero</td>
<td>2</td>
</tr>
<tr>
<td>Average/Unlock</td>
<td>4</td>
</tr>
<tr>
<td>Kg/Lb</td>
<td>3</td>
</tr>
<tr>
<td>On/Off</td>
<td>1</td>
</tr>
<tr>
<td>Recall</td>
<td>7</td>
</tr>
</tbody>
</table>

6. Using the ground reference point of either pin 5 or 6, check the resistance. The resistance should be less than 50Ω (circuit closed) when pressed —
   - If not, replace the membrane switch panel.
Testing the Ribbon Cables

If the scale is not operating correctly test the ribbon cables, which are connected to the printed circuit boards, for continuity, open shorts, and mis-wires.

Required Items:
- ESD protection

To test the PCB ribbon cables:

1. If the scale is on, press ON/OFF to turn off the scale, then unplug the power cord.
2. Disassemble the scale (see page 6-2).
3. Remove the cable and check each wire for continuity.
4. Replace any damaged PCB ribbon cables.
5. Continue testing internal components, or reassemble and calibrate the scale (see page 6-4, then page 4-3).

Testing the Main Printed Circuit Board

If the scale lights do not illuminate or appears to be malfunctioning, a PCB may be damaged. Test the PCB to confirm that it is damaged prior to replacing.

Required Items:
- ESD protection
- Voltmeter

To test the main PCB:

1. If the scale is on, press ON/OFF to turn off the scale, then unplug the power cord.
2. Disassemble the scale (see page 6-2).

NOTE

Schematics, wiring diagrams, and PCB drawings are located on pages A-1–A-9.

Before testing the PCB, check all fuses and connectors.
3 Check the supply voltages (see Table 6.2).

### Table 6.2 Main PCB test points

<table>
<thead>
<tr>
<th>ID</th>
<th>Test Point</th>
<th>Expected Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5Vdigital</td>
<td>TP1</td>
<td>5.00 ± 0.1Vdc</td>
</tr>
<tr>
<td>+5Vanalog</td>
<td>TP2</td>
<td>5.00 ± 0.1Vdc</td>
</tr>
<tr>
<td>-5Vanalog</td>
<td>TP3</td>
<td>-5.00 ± 0.5Vdc</td>
</tr>
<tr>
<td>GND</td>
<td>TP8</td>
<td>Reference</td>
</tr>
</tbody>
</table>

An S1 jumper installed on the main PCB (see page 3-15) will disable the KG/LB button, forcing the scale to only display kilograms.

4 If any voltages are out of tolerance, replace the main PCB.

5 Continue testing internal components, or reassemble and calibrate the scale (see page 6-4, then page 4-3).

### Testing the Power Supply Printed Circuit Board

If the scale lights do not illuminate or appears to be malfunctioning, a PCB may be damaged. Test the PCB to confirm that it is damaged prior to replacing.

- Schematics, wiring diagrams, and PCB drawings are located on pages A-1–A-9.
- Before testing the PCB, check all fuses and connectors.

### Required Items:

- ESD protection
- Voltmeter

### To test the power supply PCB:

1 If the scale is on, press **ON/OFF** to turn off the scale, then unplug the power cord.
2 Disassemble the scale (see page 6-2).
3 Check the supply voltages (see Table 6.3).

### Table 6.3 Power supply PCB test points

<table>
<thead>
<tr>
<th>ID</th>
<th>Test Point</th>
<th>Expected Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vin</td>
<td>J4-1</td>
<td>12.00 ± 0.25Vdc</td>
</tr>
<tr>
<td>CHG/AC_ON</td>
<td>J3-1</td>
<td>5.00 ± 0.25Vdc</td>
</tr>
<tr>
<td>GND</td>
<td>TP1</td>
<td>Reference</td>
</tr>
<tr>
<td>Vbat</td>
<td>TP2</td>
<td>7.2Vdc nominal</td>
</tr>
<tr>
<td>Vin</td>
<td>J4-1</td>
<td>12.00 ± 0.25Vdc</td>
</tr>
</tbody>
</table>

4 If any voltages are out of tolerance, replace the power supply PCB.

5 Continue testing internal components, or reassemble and calibrate the scale (see page 6-4, then page 4-3).
Replacing the Power Supply Printed Circuit Board

If the scale lights do not illuminate or appears to be malfunctioning, a PCB may be damaged. Test the PCB to confirm that it is damaged prior to replacing.

- Schematics, wiring diagrams, and PCB drawings are located on pages A-1–A-9.
- If appropriate, test the power supply PCB to determine if replacement is required (see page 6-10).

**Required Items:**
- ESD protection

**To replace the power supply PCB:**

1. If the scale is on, press ON/OFF to turn off the scale, then unplug the power cord.
2. Disassemble the scale (see page 6-2).
3. Remove the power supply PCB:
   a. Disconnect all connectors from the power supply PCB.
   b. Loosen and remove the mounting screws, then remove the power supply PCB.
4. Place the new power supply PCB into position, place and tighten the mounting screws, then connect the connectors to the power supply PCB.
5. Reassemble and calibrate the scale (see page 6-4, then page 4-3).

Testing the Display Printed Circuit Board

- Schematics, wiring diagrams, and PCB drawings are located on pages A-1–A-9.
- Before testing the PCB, check all fuses and connectors.

**To test the display PCB:**

1. If the scale is disassembled, reassemble the scale (page 6-4).
2. Press and hold KG/LB while pressing ON/OFF.
3. Verify that all lights illuminate.

**NOTE**

The charging signal only illuminates when the scale is plugged into a functioning electrical outlet.

4. Press ON/OFF to turn off the scale.
ReReplacing the Display Printed Circuit Board

- Schematics, wiring diagrams, and PCB drawings are located on pages A-1–A-9.
- If appropriate, test the display PCB to determine if replacement is required (see page 6-11).

**Required Items:**

- ESD protection

**To replace the display PCB:**

1. If the scale is on, press **ON/OFF** to turn off the scale, then unplug the power cord.
2. Disassemble the scale (see page 6-2).
3. Disconnect the ribbon cable from the display PCB by loosening and removing the five mounting screws, then remove the display PCB (see Figure 6.7).

**Figure 6.7** Removing the display PCB

4. Place the new PCB into position, place and tighten the five mounting screws, then connect the ribbon cable to the display PCB.
5. Reassemble and calibrate the scale (see page 6-4, then page 4-3).

**Entering Counts Mode**

If an electrical problem is suspect, such as the signal is beyond zero or the system appears unstable, enter counts mode.

**To enter counts mode:**

1. When the scale is off, press and hold **AVERAGE/UNLOCK** while pressing **ON/OFF**. AD (analog/digital) counts are shown.
2. To momentarily display the calibration coefficient (calconst), press **ZERO**. The calculation for conversion to grams is:
   \[
   \text{grams} = \frac{(\text{count} - \text{zero}) \times 10,000}{\text{calconst}}
   \]
3. Counts shown must be between 9000 and 13500 and remain steady. If out of range or fluctuation is more than ±4, contact Natus Medical for support (see page 5-4).
Returning for Service

When sending equipment for service:

1 Contact Natus Customer Service for a Return Merchandise Authorization (RMA) number and the location where the equipment should be sent.

2 Clean the device, securely package it, and include the RMA number on the outside of the box.

3 In the U.S., ship the equipment to:
   Natus Medical Incorporated
   5900 First Avenue South
   Seattle, WA 98108 USA
Replacement Parts

Only use Natus Medical–approved parts with the Smart Scale.

Ordering Information

To order parts and accessories, contact:

Natus Medical Incorporated
Customer Service Department
Toll-free: 1-800-303-0306
Phone: +1-650-802-0400
Fax: +1-650-802-6620
Email: customer_service@natus.com

Parts and Accessories

When ordering, provide the item number to the customer service representative.

<table>
<thead>
<tr>
<th>Item Name / Description</th>
<th>Item Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery pack</td>
<td>401391</td>
</tr>
<tr>
<td>Calibration weights, two totaling 12.5 kg ±1 gm, NIST traceable, nickel-plated steel</td>
<td>56357</td>
</tr>
<tr>
<td>Caster wheels (for cart/mobile base)</td>
<td>100066</td>
</tr>
<tr>
<td>Display panel assembly</td>
<td>400377</td>
</tr>
<tr>
<td>Display PCB assembly</td>
<td>400866</td>
</tr>
<tr>
<td>Fuse, Slo-Blo (AC), 3/8A, 250V~</td>
<td>200021</td>
</tr>
<tr>
<td>Fuse, Pico</td>
<td>200021</td>
</tr>
<tr>
<td>Power supply PCB assembly</td>
<td>400864</td>
</tr>
<tr>
<td>Ribbon cable, display to main board</td>
<td>200152</td>
</tr>
<tr>
<td>Roll-around base (cart/mobile base)</td>
<td>56359</td>
</tr>
</tbody>
</table>
Ordering Information
Specifications

Intended Use
The Olympic Smart Scale® Model 50/51 is intended for weighing infants and children up to 55 lb (25 kg).

Dimensions
Size – Scale, Both Ends Up
10-in. high x 28-in. wide x 22-in. deep
25.4-cm high x 71.1-cm wide x 55.9-cm deep

Size – Scale, Both Ends Down
10-in. high x 38.8-in. wide x 22-in. deep
25.4-cm high x 98.6-cm wide x 55.9-cm deep

Size – Model 51 Cart Only
29.5-in. high x 44-in. wide x 23.5-in. deep
74.9-cm high x 112-cm wide x 59.7-cm deep

Weight – Scale Only
51 lb 23.1 kg

Weight – Model 51 Cart Only
93 lb 42.2 kg

Electrical
Power Requirements
- Voltage: 120V~
- Consumption: 275mA
- Frequency (current): 60 ±5 Hz

Ground
Does not exceed 0.13Ω

Fuses
- One internal pico fuse
- Two internal 3AG Slo-Blo fuses

Battery Pack
Single pack with six 1700mAh SC Ni-Cad rapid-charge batteries; 7.2Vdc nominal

Environmental
Temperature
- Operating: 50–104°F 10–40°C
- Shipping: -40–158°F -40–70°C
- Storage: -4–113°F -20–45°C

Relative Humidity (RH)
- Operating: 10–95%, non-condensing
- Shipping/Storage: 10–100%, condensing

Operating Altitude (Maximum)
10,000 ft 3,000 m

Shipping/Storage Pressure
0.5–1.0 atm 500–1060 hPa

Controls
- ON/OFF (DISPLAY): Turns the scale display on or off.
- KG/LB: Changes the display between measurement units of pounds-ounces and kilograms.
- AVERAGE/UNLOCK: Calculates a four-second average an active patient and locks it on the display. Press again to unlock the display.
- ZERO: Cancels (tares out) the weight of any objects (e.g., blankets, toys) on the weighing platform; use before placing the patient on the platform.
- RECALL: Displays the last locked weight after the display has turned off.

Displays
Light-emitting diodes (LEDs) for weight display and indicator lights

External Connections
Hospital-grade power cord
Product

<table>
<thead>
<tr>
<th>Item</th>
<th>REF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Scale Model 50</td>
<td>56350</td>
</tr>
<tr>
<td>Smart Scale Model 51</td>
<td>56351</td>
</tr>
</tbody>
</table>

For additional items, see Parts and Accessories on page 7-1.

Regulatory, Electrical Safety, and Classifications

- FDA Class 1, Patient Scale
- Health Canada Class I
- CSA Class I
- CSA 601.1
- IEC 60601-1-2
- UL 60601-1
- Ordinary Equipment (IPX0)
- Type B Applied Part

Service

Service can be performed by hospital technicians. See Ordering Information on page 7-1 for more information.

Warranty

One-year warranty.

Electromagnetic Compatibility

The Smart Scale complies with the requirements of IEC 60601-1-2 (2001). For information, see pages 8-3–8-5.

Product Disposal

Disposal of the Smart Scale does not require any special precautions. Dispose of according to your local disposal regulations.

The nickel-cadmium (Ni-Cad) battery must be disposed of properly. The internal battery pack can be recycled by contacting the Rechargeable Battery Recycling Corporation (RBRC) at 1-800-822-8837 or www.rbrc.org. If the battery pack is not recycled, it must be disposed of as Hazardous Waste.
Electromagnetic Specifications – Manufacturer’s Declaration

The Olympic Smart Scale is intended for use in the electromagnetic environment specified below. The customer or the user of the Smart Scale should assure that it is used in such an environment.

Table 8.1  Electromagnetic emissions

<table>
<thead>
<tr>
<th>Emissions Test</th>
<th>Compliance</th>
<th>Electromagnetic Environment — Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Frequency (RF) Emissions CISPR 11</td>
<td>Group 1</td>
<td>The Smart Scale uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.</td>
</tr>
<tr>
<td>RF Emissions CISPR 11</td>
<td>Class B</td>
<td>The Smart Scale is suitable for use in all establishments including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.</td>
</tr>
<tr>
<td>Harmonic Emissions IEC 61000-3-2</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Voltage fluctuations/ flicker emissions IEC 61000-3-3</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.2  Electromagnetic immunity

<table>
<thead>
<tr>
<th>Immunity Test</th>
<th>IEC 60601 Test Level</th>
<th>Compliance Level</th>
<th>Electromagnetic Environment — Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic Discharge (ESD) IEC 61000-4-2</td>
<td>±6 kV contact ±8 kV air</td>
<td>±6 kV contact ±8 kV air</td>
<td>Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.</td>
</tr>
<tr>
<td>Electrical fast transient/burst IEC 61000-4-4</td>
<td>±2 kV for power supply lines ±1 kV for input/output lines</td>
<td>±1 kV for power supply lines Not applicable</td>
<td>Mains power quality should be that of a typical commercial or hospital environment. Filters on the power input lines may be necessary (see Troubleshooting on page 5-1).</td>
</tr>
<tr>
<td>Surge IEC 61000-4-5</td>
<td>±1 kV differential mode ±2 kV common mode</td>
<td>±1 kV differential mode ±2 kV common mode</td>
<td>Mains power quality should be that of a typical commercial or hospital environment.</td>
</tr>
<tr>
<td>Voltage dips, short interruptions, and voltage variations on power supply input lines IEC 61000-4-11</td>
<td>&lt;5% $U_T$ (&gt;95% dip in $U_T$) for 0.5 cycle 40% $U_T$ (60% dip in $U_T$) for 5 cycles 70% $U_T$ (30% dip in $U_T$) for 25 cycles &lt;5% $U_T$ (&gt;95% dip in $U_T$) for 5 seconds</td>
<td>&lt;5% $U_T$ (&gt;95% dip in $U_T$) for 0.5 cycle 40% $U_T$ (60% dip in $U_T$) for 5 cycles 70% $U_T$ (30% dip in $U_T$) for 25 cycles &lt;5% $U_T$ (&gt;95% dip in $U_T$) for 5 seconds</td>
<td>Mains power quality should be that of a typical commercial or hospital environment. If the user of the Smart Scale requires continued operation during power mains interruptions, it is recommended that the Smart Scale be powered from an uninterruptible power supply or a battery.</td>
</tr>
<tr>
<td>Power frequency (50/60 Hz) magnetic field IEC 61000-4-8</td>
<td>3 A/m</td>
<td>3 A/m</td>
<td>Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.</td>
</tr>
</tbody>
</table>

NOTE $U_T$ is the alternating current (ac) mains voltage prior to the application of the test level.
Table 8.3 Electromagnetic immunity

<table>
<thead>
<tr>
<th>Immunity Test</th>
<th>IEC 60601 Test Level</th>
<th>Compliance Level</th>
<th>Electromagnetic Environment — Guidance</th>
</tr>
</thead>
</table>
| Conducted RF  | IEC 61000-4-6         | 3 Vrms 150 kHz to 80 MHz | 3 V | Portable and mobile RF communications equipment should be used no closer to any part of the Smart Scale, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance: 
\[ d = 1.2 \sqrt{P} \] 
\[ d = 3.5 \sqrt{P} \quad 80 \text{ MHz to } 800 \text{ MHz} \] 
\[ d = 7.0 \sqrt{P} \quad 800 \text{ MHz to } 2.5 \text{ GHz} \] 
...where \( P \) is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and \( d \) is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, should be less than the compliance level in each frequency range. Interference may occur in the vicinity of equipment marked with the following symbol: ![symbol] |
| Radiated RF   | IEC 61000-4-3         | 3 V/m 80 MHz to 2.5 GHz | 1 V/m |

1. Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Smart Scale is used exceeds the applicable RF compliance level above, the Smart Scale should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Smart Scale.

2. Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

- At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

**NOTE**

- These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.
Recommended Separation Distances Between Portable and Mobile RF Communications Equipment and the Olympic Smart Scale

The Smart Scale is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Smart Scale can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Smart Scale as recommended below, according to the maximum output power of the communications equipment.

Table 8.4 Recommended separation distances

<table>
<thead>
<tr>
<th>Rated maximum output power of transmitter in watts (W)</th>
<th>150 kHz to 80 MHz $d = 1.2\sqrt{P}$</th>
<th>80 MHz to 800 MHz $d = 3.5\sqrt{P}$</th>
<th>800 MHz to 2.5 GHz $d = 7.0\sqrt{P}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.12</td>
<td>0.35</td>
<td>7.0</td>
</tr>
<tr>
<td>0.1</td>
<td>0.38</td>
<td>1.1</td>
<td>2.2</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>3.5</td>
<td>7.0</td>
</tr>
<tr>
<td>10</td>
<td>3.8</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>100</td>
<td>12</td>
<td>35</td>
<td>70</td>
</tr>
</tbody>
</table>

For transmitters rated at a maximum output power not listed above, the recommended separation distance ($d$) in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where ($P$) is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

- At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.
- These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.
Appendix A

Figure A.1  Smart Scale, Model 50/51 – Power supply PCB assembly, Drawing No. 400864, Rev. C
Figure A.5  Smart Scale, Model 50/51 – Display schematic, Drawing No. 700144, Rev. A
Figure A.7  Smart Scale, Model 50/51 – Main schematic, Drawing No. 700152, page 2, Rev. F
Figure A.9  Smart Scale, Model 50/51 – Wiring diagram, Drawing No. 700251, Rev. A