

## THE STRENGTHS OF HOTRONIC'S FOOTWARMER POWER PLUS!

### SYSTEMS CHECK PROCEDURES

#### COLLECT ALL COMPONENTS

- To perform Systems Check of complete FootWarmer m Series, ALL components of same FootWarmer MUST be available at the same time (2 Battery Packs, 1 Recharger, and 2 Heating Elements).

#### RECHARGER SELF-TEST

- Without Battery Packs attached, plug Recharger into known, good, live, wall outlet.
- **Does Recharger perform Self-Test with brief Red, Green, then Off LED lights?**
- Plug Recharger into outlet several times to confirm properly functioning Recharger.
- Watch Recharger LEDs closely.

#### RECHARGER POWER CORDS TEST

- With positive Self-Test confirmed and Recharger still plugged into wall outlet, attach known, good Battery Pack to each Recharger Power Cord.
- **Does each corresponding Recharger LED turn on Red when Battery Pack is attached?**

#### BATTERY PACK ON / OFF BUTTON TEST

- Briefly press-and-release ON and OFF Buttons several times.
- **Do ON and OFF Buttons physically function properly?**

#### BATTERY PACK CELLS TEST

- With Recharger still plugged into outlet, attach Battery Packs.
- **Do corresponding Recharger LEDs turn on Red for each attached Battery Pack?**
- Battery Pack MUST remain on Recharger during following tests.
- Corresponding Recharger LED turns on Red CONTINUOUSLY when Cells function properly, have a charge, and are taking a charge.
- Corresponding Recharger LED FLASHES Red within 20 minutes when Cells are incompatible with Recharger (Battery Pack models prior to m Series) or are not functioning properly (m Series Battery Pack).

#### BATTERY PACK SETTINGS TEST

- With Recharger still plugged into outlet and Battery Packs still attached to Recharger, recharge Battery Packs minimally for 10 minutes uninterrupted to ensure accurate test.
- After minimum 10 minute recharge, with Recharger still plugged into outlet and Battery Packs still attached to Recharger, turn each Battery Pack On to Setting 1, 2, 3, and 4 and then back down from 4 to 3, 2, 1, and Off.
- **Does each Battery Pack turn On and Off properly at each Setting?**
- Battery Pack MUST be recharged minimally for 10 minutes uninterrupted or test results may be highly inaccurate.
- Battery Pack MUST remain on Recharger during Settings Test.

### SYSTEMS CHECK PROCEDURES

#### BATTERY PACK HEAT TEST

- With positive tests confirmed for Recharger, Battery Pack Cells, and Battery Pack Settings, and after minimum 10 minute recharge or longer (see details), remove Battery Pack from Recharger, plug known, good Heating Element into Battery Pack, turn Battery Pack to Continuous Setting 4, and then wait for several minutes.
- **Does Battery Pack generate heat in Element?**
- Battery Pack MUST be recharged minimally for 10 minutes uninterrupted when using known, good, UNINSTALLED Heating Element.
- Battery Pack MUST be fully recharged per Operating Instructions when using known, good Heating Element INSTALLED on insole.
- To use "Continuous Setting 4", start at "Timed Setting 4", then press-and-hold ► until all LED lights blink simultaneously (~5.0 seconds).
- When using FINGERTIPS to detect heat generated in Element:
  - Wait minimally 15 minutes for Element to generate heat well above skin surface temperature. Otherwise, fingertips will fail as a heat sensing device.
  - After 15 minutes, first use fingertips to detect ambient temperatures around circumference of Element when installed on insole.
  - Then place fingertips in center of Element to detect heat generated above ambient conditions.
  - When Element is uninstalled, fingertips may detect heat well within 15 minutes.
- When using INFRARED THERMOMETER to detect heat generated in Element:
  - Wait several minutes for Element to generate heat.
  - After several minutes, first use thermometer to check ambient temperatures around circumference of Element when installed on insole.
  - Then use thermometer in center of Element to detect heat generated above ambient conditions.
  - When Element is uninstalled, InfraRed Thermometer may detect heat well within several minutes.
- NOTE: Using FINGERTIPS is not an accurate or consistent method of detecting heat.
- NOTE: Using INFRARED THERMOMETER is a more accurate and consistent method of detecting heat than fingertips. However, temperature readings are significantly impacted by surrounding materials and ambient temperatures. Temperature readings may or may not be representative of temperatures attained in standardized testing conditions used to determine published temperature ranges.

#### HEATING ELEMENT HEAT TEST

- Plug Heating Element into known, good, fully recharged Battery Pack, turn Battery Pack to Continuous Setting 4, and then wait several minutes.
- **Does Heating Element generate heat?**
- See BATTERY PACK HEAT TEST details.

**THE STRENGTHS OF HOTRONIC'S FOOTWARMER POWER PLUS!**

**SYSTEMS CHECK PROCEDURES**

**BATTERY PACK DURATION TEST**

- Condition Charge Battery Pack (48 to 72 hours uninterrupted), remove from Recharger, let rest for minimally 1 hour, turn to Continuous Setting 4, plug in known good Heating Element, and set external timer for minimum published duration of Battery Pack model.
- Reset external timer for subsequent 15 minute intervals as needed.
- **Does Battery Pack duration fall within model's published duration range for Setting 4?**
- To use "Continuous Setting 4", start at "Timed Setting 4", then press-and-hold ► until all LED lights blink simultaneously (~5.0 seconds).
- Battery Pack published duration range:
  - For model m4 is 150 to 225 minutes.
  - For model m3 is 120 to 180 minutes.
- Set external timer for minimum duration of Battery Pack model being tested. (See following chart.)
- When minimum duration is reached, check to confirm Battery Pack Continuous Setting 4 is still on and Element is still generating heat. Record results in chart below.
- When minimum duration is reached, also set timer for first 15 minute interval.
- When first 15 minute interval is reached, again check to confirm Battery Pack Continuous Setting 4 is still on. Record results.
- Continue using subsequent 15 minute intervals until Continuous Setting 4 is no longer On and Element is no longer generating heat.

Battery Pack Model →	m4	m3	Results	
Published Duration Range →	150 to 225 minutes	120 to 180 minutes	<input checked="" type="checkbox"/> #1	<input checked="" type="checkbox"/> #2
Minimum Duration →	150 minutes	120 minutes	<input type="checkbox"/>	<input type="checkbox"/>
+15 minute interval	165	135	<input type="checkbox"/>	<input type="checkbox"/>
+15 minute interval	180	150	<input type="checkbox"/>	<input type="checkbox"/>
+15 minute interval	195	165	<input type="checkbox"/>	<input type="checkbox"/>
+15 minute interval	210	180	<input type="checkbox"/>	<input type="checkbox"/>
+15 minute interval	225	195	<input type="checkbox"/>	<input type="checkbox"/>
+15 minute interval	240	210	<input type="checkbox"/>	<input type="checkbox"/>

**SYSTEMS EXPLAINED**

**BATTERY PACK: VOLTAGE CUT-OFF SYSTEM**

- To reduce potential of excessively low charge levels in Cells, "m" Series Battery Pack incorporates Voltage Cut Off System.
- Battery Pack automatically shuts Off when Voltage Cut Off System detects current at or below Cut Off Level.
- Cut Off Level in m4 Battery Pack is 3.9V (.9V per Cell).
- Cut Off Level in m3 Battery Pack is 2.7V (again .9V per Cell).
- Nominal Voltage in m4 Battery Pack is 4.8V (1.2V per Cell).
- Nominal Voltage in m3 Battery Pack is 3.6V (again 1.2V per Cell).

**RECHARGER: NEGATIVE DELTA V SYSTEM**

- "m" Series Recharger has ability to read Voltage in Battery Pack Cells.
- When decline in Voltage is detected (Negative Delta V), Battery Pack is assumed to have a full charge.
- Once detected, Recharger switches recharging rate from "full current" recharging to "trickle current" recharging to reduce potential of overcharging Cells.

**RECHARGER: TRICKLE CURRENT RECHARGING SYSTEM**

- Trickle Current Recharging protects Cells from overcharging.
- Trickle Current Recharging further enables each Cell to reach its full capacity potential.
  - Each Cell within Battery Pack self-discharges during extended periods of storage and inactivity (including prior to first use ever).
  - Because Cells self-discharge at various rates, charge levels within Cells often become "unbalanced" with other Cells in Battery Pack.
  - During subsequent recharging, one Cell may reach full charge before others, may cause brief decline in Voltage, may trigger Negative Delta V System, and may subsequently cause Recharger to switch to Trickle Current Recharging.
  - This early switch to Trickle Current Recharging causes Recharger LED to become Green and suggests Battery Pack is at full charge and full capacity potential. However, full capacity potential may not have been reached if removed from Recharger shortly after Green LED.
  - TO REACH FULL CAPACITY POTENTIAL, Trickle Current Recharging of Battery Pack MUST continue for 48 to 72 hours uninterrupted. (See RECHARGING BATTERY PACKS and CONDITIONING CHARGE in OPERATING INSTRUCTIONS.)