

# SR Scales®

by **SR**® Instruments, Inc.

**Model SR416i**



**Patient Floor Scale**

## Operating and Service Manual

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## PACKING CHECKLIST – Model SR416i Patient Floor Scale

√	DESCRIPTION	QUANTITY
	SCALE BASE w/BUILT IN DISPLAY	1 ea.
	AC WALL POWER ADAPTER (MEDICAL GRADE)	1 ea.
	CERTIFICATE OF CALIBRATION	1 ea.
	WARRANTY CARD	1 ea.
	MANUAL	1 ea.

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### ASSEMBLY

**STEP 1:** Unpack the scale system and check parts against the **PACKING CHECKLIST**. If there are any missing or damaged parts, call the Service Hotline at: 1-800-654-6360.

**STEP 2:** Place the SR416i scale system on a flat, hard floor surface. Ensure all four corners of scale are in contact with the floor and scale does not rock.

**NOTE:** Scale should not be placed on carpet or uneven floor surfaces as this may interfere with scale accuracy.

**STEP 3:** Connect the power cable to the scale and plug the power adapter into a wall outlet.

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### SYSTEM DESCRIPTION and INTENDED USE

#### SYSTEM DESCRIPTION

The SR416i Patient Floor Scale employs the latest in microprocessor and load cell technology to provide accurate and repeatable weight data. Four (4) identically matched transducers are strategically placed to ensure an accurate representation of the patient's weight.

The patient's weight is displayed on a LCD screen. With a push of a button, weight data may be viewed in either pounds or kilograms (Does not apply to KG only scales).

#### INTENDED USE

The SR416i Patient Floor Scale is a unique lightweight, low profile stand-on scale system for weighing ambulatory patients. The wide platform is designed to easily accommodate larger patients.

The SR416i Patient Floor Scale is a preferred means of gathering patient weight data of patients weighing up to 880 pounds (400 kilograms).



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## **STORAGE and TRANSPORTATION**

To maintain proper operation of this instrument, storage and transport conditions should not vary outside the following conditions: Relative Humidity Range of 0% to 85%, Ambient Temperature Range of 14°F to 122°F (-10°C to 50°C).

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## **ANTIMICROBIAL PROTECTION**

Antimicrobial technology has been added to help reduce the growth of bacteria as part of a medical center's approach to creating a cleaner healthcare environment.

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## CLEANING and DISINFECTING

### CLEANING

To clean the display / user interface and other scale contact areas:

- Use a soft cloth dampened with water and mild detergent to clean scale surfaces.
- Wipe surface with clean soft cloth dampened with water and then dry with clean soft cloth.
- Do not use abrasive materials to clean scale surface to prevent damage to the surface finish.
- Do not spray liquid directly onto scale surfaces. Use only a damp cloth.

### DISINFECTION

To disinfect the display / user interface and other scale contact areas:

- Use a soft cloth dampened with disinfectant or a damp disposable disinfectant cloth. Cloth cannot be dripping wet. Follow manufacturer's instruction on the proper use of commercially available disinfectants.
- Disinfectant solutions with 1% sodium hypochlorite or 70% isopropyl alcohol are suitable for display / user interface and other scale contact surfaces.
- After disinfecting, use a soft cloth dampened with clean water and dry with a soft clean cloth to prevent buildup of material on scale finish.
- Do not use abrasive material to disinfect / clean scale surfaces to prevent damage to the surface finish.
- Do not spray liquid directly onto scale surfaces. Use only a damp cloth.

**WARNING: DO NOT SPRAY CLEANING SOLUTION OR LIQUIDS DIRECTLY ON SURFACES TO BE CLEANED.**

**WARNING: EXPOSURE TO EXCESSIVE LIQUID WILL DAMAGE USER INTERFACE KEYPAD.**

**WARNING: DO NOT USE PRESSURIZED WATER OR STEAM. THE SCALE SYSTEM CONTAINS ELECTRONIC COMPONENTS THAT MAY BE ADVERSELY AFFECTED BY EXPOSURE TO SUCH AN ENVIRONMENT.**

## SPECIFICATIONS

<b>MAXIMUM WEIGHT CAPACITY</b>	880 lb (400 kg)
<b>DIMENSIONS</b>	26.6 in x 18.5 in (68 cm x 47 cm)
<b>DISPLAY TYPE</b>	1" Digit LCD
<b>DISPLAY RESOLUTION</b>	+/- 0.1 lb (0.1 kg)
<b>ACCURACY</b>	0.1% +/- 1 digit of displayed resolution for calibrated range
<b>AUTO ZERO</b>	One button operation
<b>AUTO WEIGH</b>	Scale will automatically turn on and lock in on a stable weight.
<b>AUTO POWER DOWN</b>	After 1 minute
<b>AVERAGING</b>	Automatic digital filter
<b>POWER SUPPLY</b>	Medical Grade AC Wall Power Supply
<b>CALIBRATION</b>	Calibration is traceable to NIST standards
<b>OPERATING CONDITIONS</b>	Normal operating conditions for this product: Ambient Temperature Range: 68°F to 85°F (20°C to 30°C) Relative Humidity Range: 0% to 85% Avoid exposure to high-pressure water or steam
<b>TRANSPORATION AND STORAGE</b>	Storage conditions should not vary outside the following conditions: Ambient Temperature Range: 14°F to 122°F (-10°C to 50°C), Relative Humidity Range: 0% to 85%

## BUTTON FUNCTIONS

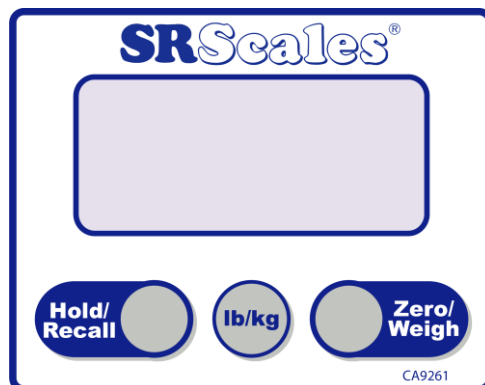


Figure 1: SR416i Button Label

### ZERO / WEIGH

The “**Zero/Weigh**” button is used to zero the system before placing a patient onto the scale system. Ensure that nothing is in contact with the weighing surface during this procedure. Press and hold the “**Zero/Weigh**” button until the display reads “**ZERO**”, then release and wait until the display reads “**0.0**”. When the patient is in position on the scale, the weight will be displayed.

**NOTE:** When the system is zeroed, the Hold/Recall memory is erased.

### LB / KG BUTTON

Patient weight data may be viewed in either pounds or kilograms. Pressing the “**lb/kg**” button allows the operator to toggle between the two readings.

### HOLD/RECALL BUTTON

Scale will automatically lock a stable weight that is greater than five pounds and “**MEM**” will be displayed in the upper left of the display. To manually hold a weight reading at any time during the weighing process, press the “**Hold/Recall**” button. To recall a weight in memory, press the “**Hold/Recall**” button after the display has powered down or with less than five pounds on the scale.

**NOTE:** When the scale is off, pressing any of the buttons will turn on the scale. Press and hold the “**Zero/Weigh**” button to erase the last held weight from memory.

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## BASIC SYSTEM OPERATION

### PATIENT WEIGHING

**STEP 1:** Place scale on hard smooth floor surface to ensure accurate data.

**NOTE:** Avoid carpeting or uneven flooring surfaces.

**STEP 2:** The scale will automatically turn on when weight is detected over five pounds and then lock in on a stable weight.

Alternatively, press the “**Zero/Weigh**” button and wait for the display to indicate “ZERO”. Release the “**Zero/Weigh**” button and the display will read “**0.0**”. Position the patient on the platform. Weight will be displayed in a few seconds. A stable weight will automatically be stored in memory.


**STEP 3:** To manually hold a weight reading at any time during the weighing process, press the “**Hold/Recall**” button.

**NOTE:** When the scale is off, pressing any of the buttons will turn on the scale. Press and hold the “**Zero/Weigh**” button to erase the last held weight from memory. Only the last stabilized weight will be held in memory.


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### SCREEN DISPLAYED SYMBOLS:

 Scale is zeroed and stabilized

**MEM** Weight is locked in memory (next stable weight will override memory).

 Applied weight load has stabilized



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## THEORY OF OPERATION

SR Instruments patient weighing systems are digital scales. Strain-gauge force cells convert the force of an applied weight into an analog signal. This signal is amplified by an operational amplifier and converted to a digital signal by analog to digital converter. The digital signal is transferred to a micro-controller where it is filtered, converted to appropriate units, and displayed on a liquid crystal display.

Strain-gauge force cells each contain four strain gauges mounted in a full Wheatstone-bridge configuration. These bridges convert the physical movement of the force cell, due to the applied mass on the system, into minute changes in electrical resistance. These changes in resistance produce a voltage difference across the Wheatstone-bridge, which is amplified by the operational amplifier.

The output of the operational amplifier is digitized by the analog to digital converter. The converter integrates the analog signal onto the integrating capacitor over a short interval. The integrating capacitor is then discharged at a rate proportional to the reference voltage applied to the converter. The residual voltage on the integrating capacitor is then multiplied by a factor and again discharged at a rate proportional to the reference voltage. The residual voltage from this discharge is again multiplied by a factor and again discharged. The time taken to discharge the capacitor is proportional to the voltage from the operational amplifier, which is proportional to the applied load on the force cells. The time is stored as a binary number in the analog to digital converter and is transferred to the micro-controller when the conversion is complete.

The micro-controller averages and filters the digital output of the analog to digital converter, subtracts the value saved during the system zero operation and scales the filtered output, then displays the result on the liquid crystal display. The micro-controller performs a rolling average of data for continuous weigh and averages the data before locking in on the reading.

## CALIBRATION



### IMPORTANT



**CALIBRATION CHECK:** Qualified service personnel only should perform this procedure. Load cells have no user serviceable components and should not be tampered with for any reason. Re-calibration is generally not required, but should be verified periodically to ensure accuracy. The recommendation for calibration check is at least once every 12 months, or as individual maintenance policy requires.



### CAUTION

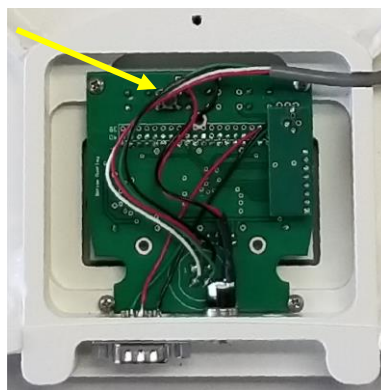


The integrated circuits and semiconductors on the printed circuit boards may be damaged by electrostatic discharge (ESD). Be sure to use proper handling precautions at all times.

## INITIAL SYSTEM SETUP

When initially set up, calibration is factory set and re-calibration is not needed. The Local Gravitational Acceleration may have to be re-set for the current geographical location for improved accuracy. Automatic Shut Off is shipped with a factory default of 60 seconds. If a longer period of time (up to 900 seconds) is desired, then it will need to be re-set in calibration mode. Both procedures are found below.

To access all settings below, remove the feet, spacers and seven (7) screws holding the bottom cover on. Press the calibration button (Figure 2) and CAL mode will now be active. The LCD will show “CAL”.



**Figure 2: Calibration Button**

## CALIBRATION (Cont'd)

### ACCESS SYSTEM SETUP

The Right Button allows you to toggle through the menus without saving any parameters. The Left Button permits a menu item to be selected or a parameter saved (Figure 3).

**NOTE:** Ensure that nothing is in contact with the scale system during this procedure. Remove hands from the system when noting the displayed calibration results.

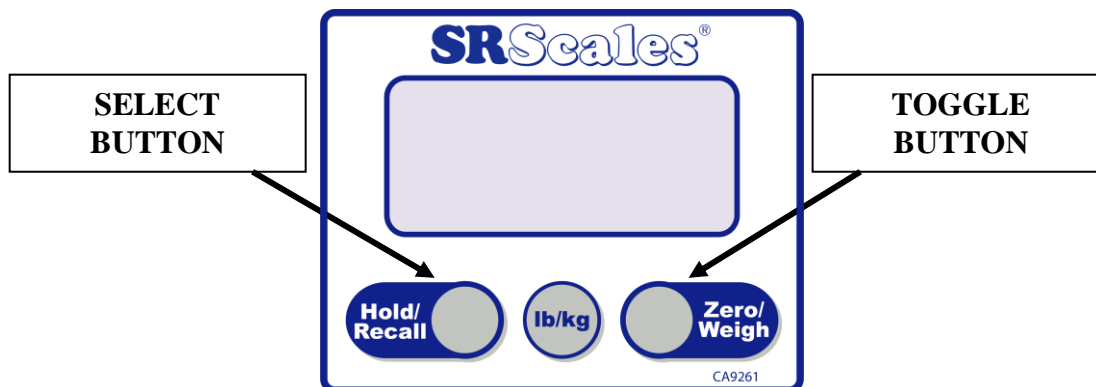


Figure 3: Select and Toggle Buttons

### CAL MENU

- “data” Displays saved calibration and model information
- “unit” Set the available units; lb only, kg only, or selection of lb or kg with mode button
- “sec” Set Auto Power Down Timer between 15 and 900 seconds
- “grav” Set Gravitational Acceleration in  $m/s^2$
- “Full” Applied calibrated mass at full scale
- “Half” Used with three point calibration curve. Applied calibrated mass at a second point between zero and full scale, usually at half
- “zero” No calibrated weight applied
- “2 pt” Two-point calibration curve, zero and full scale
- “3 pt” Three-point calibration curve; zero, half and full scale
- “save” Saves the calibration data
- “quit” Quits without saving the calibration data

### Enter CAL Mode

To enter the CAL mode, press the calibration button (Figure 2). Toggle through the menu with Right Button (Figure 3). Select or Save data with the Left Button (Figure 3).

### Units value: (Optional)

- a) While in the CAL mode press the Right Button until the display shows “UNITS” then press the Left Button to select.
- b) Toggle the Right Button to select “lb-kg” (other options are “lb” and “kg”). Press the Left Button to save the “lb-kg” only setting.

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## CALIBRATION (Cont'd)

### Auto Power Down Timer: (Optional)

- a) Select the Auto Power Down Timer from the CAL menu by pressing the Left Button when the display shows “sec”.
- b) The display will show four digits <0123>.
- c) Set the desired time in seconds by selecting the first digit and toggle through the digits using the Right Button until desired value is shown. Press the Left Button and continue the same with the remaining digits. The value cannot be less than 15 or greater than 900.
- d) Press the Left Button to save or Right Button to toggle to "quit". Select "quit" by pressing the Left Button to quit without saving changes.
- e) Press the Left Button again to save and the display will show “SAV’d”.

### Gravitational Acceleration: (Optional)

**NOTE:** Setting the local gravitational acceleration, “gLOC”, will not affect the calibration. The local gravitational acceleration, “gLOC”, will become the calibrated gravitational acceleration, “gCAL” only when it is recalibrated.

- a) Select the Gravitational Acceleration from the CAL menu by pressing the Left Button when the display shows “grav”.
- b) The display will show only the four digits to the right of the decimal point <9.XXXX>.
- c) Set the local gravitational acceleration in  $m/s^2$  by selecting the first digit and toggle through the digits using the Right Button until desired value is shown. Press the Left Button and continue the same with the remaining digits.
- d) Press the Left Button to save or Right Button to toggle to "quit". Select "quit" by pressing the Left Button to quit without saving changes.
- e) Press the Left Button again to save and the display will show “SAV’d”.

### Full-Scale value: (Optional)

**NOTE:** The Full-Scale value should be at least 200 kilograms (440 pounds) (half the maximum scale capacity)

- a) Select the Full-Scale from the CAL menu by pressing the Left Button when the display shows “FULL”.
- b) The display will show only the five digits <XXXX.X> with the thousand-place flashing <1>. Select past to the next digit by pressing the Left Button.
- c) Once in the hundreds-place, set the full scale value (maximum load) by toggling using the Right Button through the digits until desired value is shown. Select the desired value by pressing the Left Button and continue the same with the remaining digits.
- d) Press the Left Button to save or Right Button to toggle to "quit". Select "quit" by pressing the Left Button to quit without saving changes.
- e) Press the Left Button again to save and the display will show “SAV’d”.

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## CALIBRATION (Cont'd)

### Half-Scale value: (Optional)

**NOTE:** The Half-Scale value is used only with the three-point calibration. It is a value between zero and the Full Scale values. It is usually close to half of the Full Scale value.

- a) Select the Half-Scale from the CAL menu by pressing the Left Button when the display shows "**HALF**".
- b) The display will show only the five digits <XXXX.X> with the thousand-place flashing <1>. Select past to the next digit by pressing the Left Button.
- c) Once in the hundreds-place, set the half scale value by toggling using the Right Button through the digits until desired value is shown. Select the desired value by pressing the Left Button and continue the same with the remaining digits.
- d) Press the Left Button to save or Right Button to toggle to "*quit*". Select "*quit*" by pressing the Left Button to quit without saving changes.
- e) Press the Left Button again to save and the display will show "**SAV'd**".

### Calibrate using the Two-Point Calibration Curve; zero and full scale.

**NOTE:** The scale can also be calibrated with a Three-point slope "**3Pt**".

**NOTE:** Select known calibrated weights, traceable to NIST. **DO NOT USE** barbells or uncalibrated weights. The displayed calibrated weight should be within the Accuracy tolerance as listed in the "**SPECIFICATIONS**" table on page 5.

- a) Select Two-point calibration curve by pressing the Left Button when the display shows "**2Pt**".
- b) With no load applied, zero the scale by pressing the Left Button when the display shows "**ZERO**".
- c) Display will show "**FULL**", apply the predetermined full scale value on the scale and press the Left Button.
- d) Display will show "**SAVE**", press the Left Button to save, display will show "**SAV'd**" or Right Button to toggle to "*quit*". Select "*quit*" by pressing the Left Button to quit without saving changes.
- e) Save the parameter changes while in the CAL mode by pressing the Left Button when the display shows "**SAVE**". To exit the CAL mode without saving the changes press the Left Button when the display shows "**quit**".
- f) Press the calibration button (Figure 2) and re-attach the bottom cover, spacers and feet.

## TROUBLESHOOTING

SYMPTOM	REASON/CORRECTIVE ACTION
Weight reading is much lower than expected.	Check that the platform is clear underneath, stand on each corner to see if one corner is not weighing correctly.
System fails to perform correctly	Check power supply connections. Set scale on smooth, hard floor surface. Make sure patient is clear of any obstacles and that nothing, including the caregiver, is touching the patient or scale.
<b>For additional information or assistance, telephone our Service Hotline: 1-800-654-6360 or e-mail: <a href="mailto:sri@srinstruments.com">sri@srinstruments.com</a></b>	

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## WARRANTY

### FOUR (4) YEAR LIMITED WARRANTY

Each **SR Scales**<sup>®</sup> system is manufactured with high quality components. SR Instruments, Inc. warrants that all new equipment will be free from defects in material or workmanship, under normal use and service, for a period of four (4) years from the date of purchase by the original purchaser. Normal wear and tear, injury by natural forces, user neglect, and purposeful destruction are not covered by this warranty. Warranty service must be performed by the factory or an authorized repair station. Service provided on equipment returned to the factory or authorized repair station includes labor to replace defective parts. Goods returned must be shipped with transportation and/or broker charges prepaid. SR Instruments, Inc.'s obligation is limited to replacement of parts that have been so returned and are disclosed to SR Instruments, Inc.'s satisfaction to be defective. The provisions of this warranty clause are in lieu of all other warranties, expressed or implied, and of all other obligations or liabilities on SR Instruments, Inc.'s part, and it neither assumes nor authorizes any other person to assume for SR Instruments, Inc. any other liabilities in connection with the sale of said articles. In no event shall SR Instruments, Inc. be liable for any subsequent or special damages. Any misuse, improper installation, or tampering, shall void this warranty.

### DAMAGED SHIPMENTS

Title passes to purchaser upon delivery to Transportation Company. Purchaser should file any claims for shortage or damage with the delivery carrier and should refuse any shipment that has obvious external damage.

### RETURN POLICY

All products being returned to SR Instruments, Inc. require a Return Goods Authorization number (RGA). To receive an RGA, call our Customer Service at 716-693-5977 ext 103 or toll-free in the USA and Canada at 800-654-6360 ext 103.

When inquiry is made, please supply model and serial numbers, purchase order and reason for return.

Generally, deleted, damaged, and outdated merchandise will not be accepted for credit. A minimum restocking charge of 15% will be assessed on return of current merchandise unless scale is returned because of SR error.

No returns will be accepted after 30 days.

All returns are to be shipped **FREIGHT PREPAID** to: SR Instruments, Inc., 600 Young Street, Tonawanda, NY 14150.

### RESTOCKING FEE

- **15% fee** will be assessed on return of current merchandise
- **No fees** will be charged if the scale is returned because of an error on the part of SR Instruments, Inc.
- **No returns** accepted after 30 days.

# **SR**Scales®

By **SR** Instruments, Inc.

**Precision & Technology in  
Perfect Balance™**