# Analytical Balance
# W3100 Series

# Operating Manual


**version: 2/2022 (remote connected control panel)**

# CONTENTS

# 1. INTRODUCTION

To ensure proper operation performance from of your Accuris Analytical balance, please read this manual in its entirety before use.

Accuris balances have been designed and developed with our scientific customers' requirements in mind. The Analytical Balance range incorporates advanced electromagnetic sensing technology, combined with mechanical engineering and software technology to provide the following features:

- Easy Operation.
- Easy to read, large LCD screen with a white backlight;
- Remotely connected control/display panel;
- Rapid weighing speed 10 times faster than mechanical balances;
- Capability to tare up to the maximum capacity of the balance；
- Multiple weighing modes:
  1) Standard weighing 2) Piece counting 3) Percentage weighing
- Choice of weighing units: grams, carats, or ounces.
- RS-232 interface for connecting peripheral device such as a computer or a printer;
- Alarm to indicate malfunction
- Easy, in-lab calibration options

# 2. INSTALLATION

## 2-1 UNPACKING

CAUTION: Always handle your Accuris balance with care. The internal, electromechanical components have been assembled and adjusted at our factory to ensure accurate performance, but mishandling and physical shock can damage the internal mechanisms.

Carefully remove the balance from the carton and foam protective pieces. Check the balance to make sure there has not been any damage during shipping. Check the contents of the package to make sure you have received all of the parts.

**Remove the brass shipping screw from the bottom of the balance. See separate instruction insert that has been provided inside the draft shield enclosure**

**IMPORTANT: Retain the original packaging for safe, future transportation for service or relocation. Use of alternative packaging may invalidate the warranty. If you need additional information on shipping the instrument for service, contact Benchmark Scientific at 908-769-5555.**

## Packing List

| No. | Item | Quantity |
|---|---|---|
| 1 | Analytical Balance Unit | 1 |
| 2 | Remote connectable control panel | 1 |
| 3 | Weigh Pan (top) | 1 |
| 4 | Pan Support (bottom) | 1 |
| 5 | AC power adapter | 1 |
| 6 | Operating Manual | 1 |
| 6 | Standard weight (F1 Class) included with W3100-120 and W3100-210 external calibration models only | 1 |

IMPORTANT: It is recommended to save the cartons and packing materials for storing and transporting the balance or returning it for any required servicing.

### 2-2 SPECIFICATIONS

| Model | **W3100-120** | **W3100-210** | **W3100A-120** | **W3100A-210** |
|---|---|---|---|---|
| Capacity | **120g** | **210g** | **120g** | **210g** |
| Calibration | External | | Internal “Quick-Cal” | |
| Readability | 0.0001g | | | |
| Repeatability | ±0.0001g | | | |
| Linearity<br>Four-corner | ±0.0002g<br>±0.0002g | | | |
| Stabilization | Approx. 5 sec. | | | |
| Sensitivity | 2ppm/℃ (10℃-30℃) | | | |
| Operating temperature | 5℃—40℃ | | | |
| Pan size | 90mm Diameter | | | |
| Dimensions (W x H x D) | 32x47x28 cm<br>12.5x11x18.5 inches | | | |
| Power | AC 110 to 230V, 50/60 Hz | | | |

## 2-3 ENVIRONMENTAL REQUIREMENTS

Your Accuris balance is a precision instrument, and requires an environment which is free from excessive air flow, dust, corrosive elements, vibration and temperature or humidity extremes. An unsuitable environment will adversely affect the performance of your balance.

- The area and environment where your balance is used should be kept clean and dry all time;
- The optimal operating temperature is 20℃ (68°F) and 50% relative humidity;
- Always use a stable AC power source that meets the input specifications of the AC/DC power adapter.
- Do not situate the balance:
    - In direct sunshine;
    - Next to windows or doors where there can be excessive air movement or rapid temperature fluctuations;
    - Near a heater or air conditioner;
    - Near vibrating, rotating or reciprocating equipment;
    - Near a magnetic field or equipment that generates a magnetic field;
    - On an unstable surface;
    - In areas where there are corrosive vapors;

## 2-4 SETTING UP YOUR BALANCE

**CAUTION:** Always allow the balance to warm up in its ambient environment for 2 hours prior to use.
If the balance is moved from a cold environment to a warmer environment, keep the balance in a sealed bag during the warm up time. This will prevent condensation from forming on the internal components and external surfaces of the balance.

1. Place the balance unit on a stable and level surface;
2. Level the balance by turning the adjusting feet, checking the level indicator on the balance, until the bubble appears in the center of the circle;
3. Carefully place the pan support and the pan into position on the weighing mechanism. These parts should be carefully put into place, no downward force is required;
4. Connect the remote control panel to the balance unit by plugging in

the connecting cable.

5. Plug the AC adaptor in to a suitable electrical outlet and into the back of the balance. Use the threaded connector nut to firmly connect the power cord to the balance.

## 3. OPERATING YOUR BALANCE

NOTE: To avoid dust from entering the internal weighing mechanism, keep your balance door closed whenever it is not in use.
Plug in and pre-warm your balance at least 30 minutes before use.

### 3-1 Basic weighing

- Press the power key, the balance will turn on and display 0.0000g
- Place a weigh boat or weighing container on the weighing pan
- Press the TARE key and wait for the display to show 0.0000g
- Place the sample onto the container and close the draft shield doors
- The display will stabilize and the weight will be displayed
- Repeat the steps to weigh the next sample

### 3-2 Count weighing

This function is used to determine a total number of pieces of similar weights. A known number of pieces are weighed as a reference, and the average weight of each piece is automatically calculated. An unknown quantity of pieces can then be calculated.

1. First set the sample quantity that will be used as the reference quantity weight. See the section 5-2 for PARAMETER SETTING. For example, for a reference quantity weight of 50 pcs, set up function C2 at setting 2 (display will read C2--2.)
2. Press the TARE key, the balance will display 0.0000g.
3. Press the MODE key repeatedly until the units “PCS” is displayed.
4. Place the sample on the pan, then press the SET key, the balance will read the amount number of the samples.

Press the MODE key to change out of the counting mode.

## 3-3 Percent Deviation

This mode is used to calculate the percentage of weight a sample varies from a reference weight.

1. Empty the weigh pan;
2. Press the TARE key to zero the display;
3. “0.0000 g” will be displayed; Press MODE key till the display is % mode.
4. Place the reference weight onto the weigh pan, and close the doors;
5. Press the SET key. 100% will be displayed;
6. Remove the reference weight from the weigh pan;
7. Place an object to be compared to the reference weight onto the weigh pan and close the draft shield doors.
8. A percentage value of the deviation between reference and the sample will be displayed.

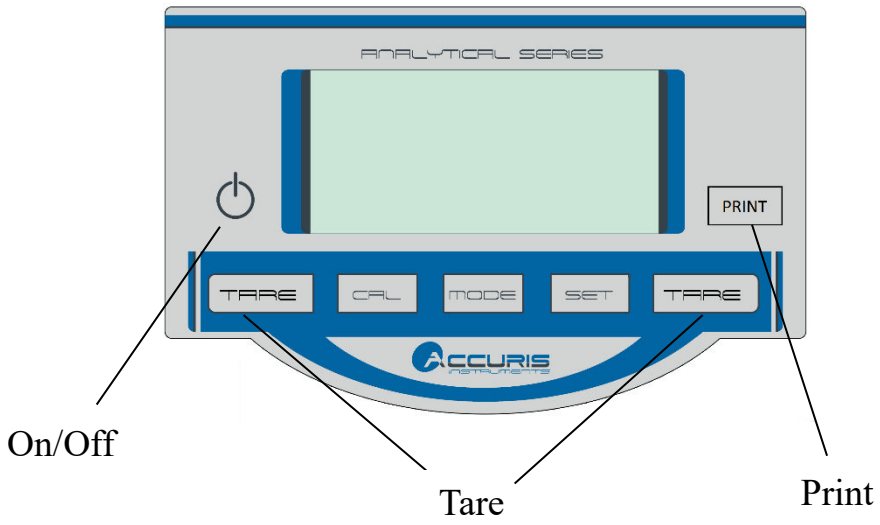
## 3-4 DISPLAY AND CONTROL PANEL

DISPLAY SYMBOLS

| | |
|---|---|
| g | Gram |
| ct | Carat |
| Lb | Pound |
| oz | Ounce |
| pcs | piece counting mode |
| % | percentage mode |
| ○ | Indicates the weight is stable |
| ＋ | positive indicator |
| － | negative indicator |
| ……. | Waiting |
| CAL in | Calibration starting |
| CAL dn | Load the appropriate calibration weight |
| CAL ... | Calibrating |
| CAL up | Unload the calibration weight |
| CAL-no | Not calibrated properly |
| CAL end | Calibration complete |

| | |
|---|---|
| ＋E | over the max capacity |
| －E | under the readability |
| ------ | Set key valid |
| . | Reading the data |
| SAVE --- | Saving |
| S --- END | Saving complete |

## Control Panel and Display:




## 4. CALIBRATION

### Background

The Accuris analytical balance uses the equilibrium principle of electronic magnetic force. Among the various factors that may affect the accuracy of the balance, gravitational force is the most significant. In different geographical areas on the earth, gravitational force varies, and a balance should be calibrated at its specific installation location.

The Accuris Analytical Balance can be calibrated using the internal "Quick-Cal" feature (only available on models W3100A-120 and W3100A-210) or by calibrating to a known reference weight.

## 4-1 INTERNAL "QUICK-CAL™" (Models W3100A-120 and W3100A-210)

The factory setting for this model is with internal calibration set. If the mode needs to be changed, FUNCTION C1 should be set to 0 (C1- 0). See section 5, Function Setting.

- Plug in and pre-warm the balance for at least 30 minutes before calibration.
- Turn on the balance by pressing the power key.
- Make sure that the weigh pan is installed and empty.
- Press the CAL key after "0.0000 g" is displayed.
- The display will show CAL 100.
- Press the CAL button again.
- The balance will run through its internal calibration process automatically.

## 4-2 CORRECTING INTERNAL CALIBRATION WEIGHT VALUE

Note: this feature is available for Internal Calibration balances only. The value of the internal calibration weight can be adjusted, if after an internal calibration the displayed weight outside of the accuracy specification of the balance.

Set up your balance per section 2-4 of this Operating Manual; let the balance equilibrate completely to the room temperature, then run the Internal Calibration per section 4-1.

Check the calibration using a suitable 100g calibration weight, and if the displayed value is outside of specification, greater than 100.0002, or less than 99.9998, the internal calibration weight value can be adjusted.

1. Change the function mode C3 to setting C3 – 1:
    a. Press SET key : ……. Is displayed
    b. Press PRINT key: C1-0 is displayed
    c. Press TARE key 2 times: C3-0 is displayed
    d. Press PRINT key to change to C3-1
    e. Press Power button: SAVE … is displayed

f. Press TARE button: S.. End is displayed.
g. The calibration motor will run then 0.0000 is displayed
h. Press Power button to enter stand by mode.

2. Press CAL key and then TARE alternatively and the number on the display will increase: 1, 2, 3, 4, etc. until 7 is displayed.
3. When the display shows 7, press the On/Off button. The display will show the current calibration weight adjustment value. Note this value as the current adjustment value.
4. Press CAL, and 100.0000 will flash on the display.
5. If the displayed value during the calibration check was ***lower*** than
6. 100.0000g (for example: 99.9995), then the internal cal reference needs to be increased by 0.0005. Press SET repeatedly to increase the weight value in 0.0001g increments until the new correction value is 0.0005 greater than the current adjustment value.
7. If the displayed value during the calibration check was ***higher*** than
8. 100.0000g (for example: 100.0005), then the internal calibration adjustment value needs to be decreased by 0.0005. Press CAL repeatedly to decrease the weight value in 0.0001g increments until the new correction value is reached.
9. Press TARE to save the weight value, then press On/Off button to return to standby mode.
   Adjust the function mode C3 back to the value C3-0 per above instructions.
10. Run the Quick-Cal program and check the results with the 100g calibration weight. If the displayed value is off, repeat the adjustment steps.

**4-3 MANUAL CALIBRATION** (Models W3100-120 and W3100-210)
Plug in and pre-warm your balance at least 30 minutes before performing a the calibration procedure

- Press the Power button to turn on the balance
- "0.0000 g" will be displayed;
- Press CAL key, "CAL100" will be displayed.
- Choose "CAL 100" for a 100g weight or "CAL 200" for a 200g weight by pressing TARE.

- Press CAL key again and "CAL …" is displayed.
- Wait for "CAL dn" to be displayed.
- Carefully place an external calibration weight of 100g or 200g (it is recommended to use the calibration weight included with your balance, or supplied by Benchmark Instruments) on the center of the pan then close the doors; the balance will calibrate to the weight and display 100.0000 (or 200.0000) when complete.

Note: After calibration, check that the tolerance between the displayed value and the calibration weight value is no more than ±0.0002 g. Otherwise, repeat the calibration steps.

## 4-4 LINEAR CALIBRATION

If after manual or internal calibration, the displayed weights across the range of the balance are not accurate, linear calibration is required. Linear calibration requires calibration weights 50g, 100g, and 150g. Plug in and pre-warm your balance at least 30 minutes before performing the linear calibration procedure.

1. When the balance is in Standby Mode (plugged in to power, On/Off set to Off) press the CAL button.
2. The display will show 1. Press TARE then CAL, TARE, CAL alternatively and the number on the display will increase: 1, 2, 3, 4, etc.
3. When the display shows 8, press the On/Off button. The display will show 8888888
4. Press CAL to enter linear calibration mode, and wait for the balance to carry out the zero point calibration and Lnr 50 will be displayed
5. When Lnr 50 is displayed, place a 50g calibration weight on the pan and press TARE. Lnr will be displayed and then Lnr 100.
6. When Lnr 100 is displayed, place a 100g calibration weight on the pan and press TARE. Lnr will be displayed and then Lnr 150.
7. When Lnr 150 is displayed, place a 150g calibration weight on the pan and press TARE. When linear calibration is complete the display will show 0.0000g.
8. Remove the calibration weight and press TARE. Linear calibration is complete.

## 4-5 200g CALIBRATION

The W3100A-210 balances may require an additional calibration near the maximum capacity of the balance (200g Calibration). If after calibration and linearity adjustment, the values are off in the range of 180g to 200g, a 200g calibration is required.
Follow these steps:

1. Switch on the balance, so "0.0000g" is displayed
2. Press the CAL button: CAL 100 is displayed
3. Press TARE: CAL 200 is displayed
4. Press CAL button again: CAL in, then CAL …, then CAL dn is displayed.
5. Place a 200g calibration weight onto the weigh pan. Display will show CAL …, then CAL up.
6. Remove the calibration weight, and the calibration is finished. Check the linearity at different weight values to confirm proper calibration. If the results are outside of specification, repeat above steps.

# 5. FUNCTION SETTINGS

### 5-1 CHANGING FUNCTION SETTINGS

You can reset and change the function as follows.

- Turn on the balance with the weigh pan empty;
- Wait for the display to show 0.0000g
- Press the SET key then the PRINT key to enter the FUNCTION SETTING MODE.
- C1- - - 0 will be displayed.
- Press the TARE key to scroll through the different available FUNCTIONS from C1 through C9.
- Press the PRINT key to change the FUNCTION setting numbers.
- When finished changing a FUNCTION SETTING, press the TARE key, and the display will show the next FUNCTION.
- Press the Power Button, and "SAVE _ _ _ " will be displayed.
- Press the TARE button, and "S - - End" will be displayed.

- Press On/Off.

  The new function settings are now stored in memory.

## 5-2 FUNCTION SETTING INDEX

| FUNCTION | SETTING | DETAILS |
|---|---|---|
| C1:Calibration mode | C1—00 | Auto-calibration using the internal weight |
| | C1—01 | Manual calibration using external weight |
| C2:Set the reference number of samples for piece counting | C2—0 | 10 |
| | C2—1 | 20 |
| | C2—2 | 50 |
| | C2—3 | 100 |
| | C2—4 | 1000 |
| C3:Data control | C3—00 | No “0” point tracking status |
| | C3—01 | 1d |
| | C3—02 | 2d |
| | C3—03 | 3d |
| | C3—04 | 4d |
| | C3—05 | 5d |
| | C3—06 | Not for user |
| C4:Serial baud rate | C4—00 | 2400 |
| | C4—01 | 1200 |
| | C4—02 | 4800 |
| | C4—03 | 9600 |
| C5:Data output mode | C5—00 | On zero stable |
| | C5—01 | On stable |
| | C5—02 | On command |
| | C5—03 | Continuous |
| C6: Audible beep on key press | C6—00 | Off |
| | C6—01 | On |
| C7: Unused | | |
| C8: Unused | | |
| C9: Unused | | |
| | | |

# 6. TROUBLE SHOOTING

| Problem | Possible Cause | Solution |
|---|---|---|
| No Display | • No power<br>• AC/DC Power Adapter not functioning, or incorrect specifications | • Plug in the AC/DC adapter<br>• Replace the adapter<br>• Contact the Service Department |
| Displayed weight value is unstable | • Unsuitable environment<br>• Draft shield door is not closed properly<br>• There is an object under the weigh pan<br>• Unstable power supply<br>• Balance has not equilibrated to operating temperature<br>• The object weighed is unstable (evaporation or absorption of moisture) | • Install the balance in a suitable location, avoid vibration, air movement, temperature fluctuations<br>• Close the door properly<br>• Remove any objects or materials that may obstruct the pan<br>• Power on the balance and let it rest for 1 hour to reach operating temperature |
| Weighing value is not accurate | • The balance is not calibrated<br>• The display is not tared before weighing<br>• The balance is not properly leveled<br>• Balance has not equilibrated to room temp. | • Calibrate the balance<br>• Press TARE key to zero the display<br>• Level the balance by turning the adjusting feet<br>• Power on the balance and let it rest for 1 hour to reach operating temperature |

## 7. CARE AND MAINTENANCE

The Accuris Analytical Balance is a high precision instrument that must be handled carefully and properly maintained.

- Do not use sharp objects（such as a pen or pencil) on the keypad.
- Do not let objects fall on the weighing pan, otherwise the weighing system can be damaged;
- Do not expose the balance to high temperatures or dust;
- Do not disassemble the balance without proper training or instructions;
- It is recommended to cover the balance when not in use, and keep the balance clean and dry.

### 7-1 Cleaning

- Unplug the AC adapter before cleaning;
- Do not use any aggressive cleaning agents such as solvents or alcohols;
- Use a damp, soft cloth with mild detergent such as soap;
- Do not allow any liquids to enter the balance;
- After cleaning, wipe dry the balance with a piece of soft and dry cloth.

PO Box 709

Edison, NJ 08818

USA www.benchmarkscientific.com www.accuris-usa.com