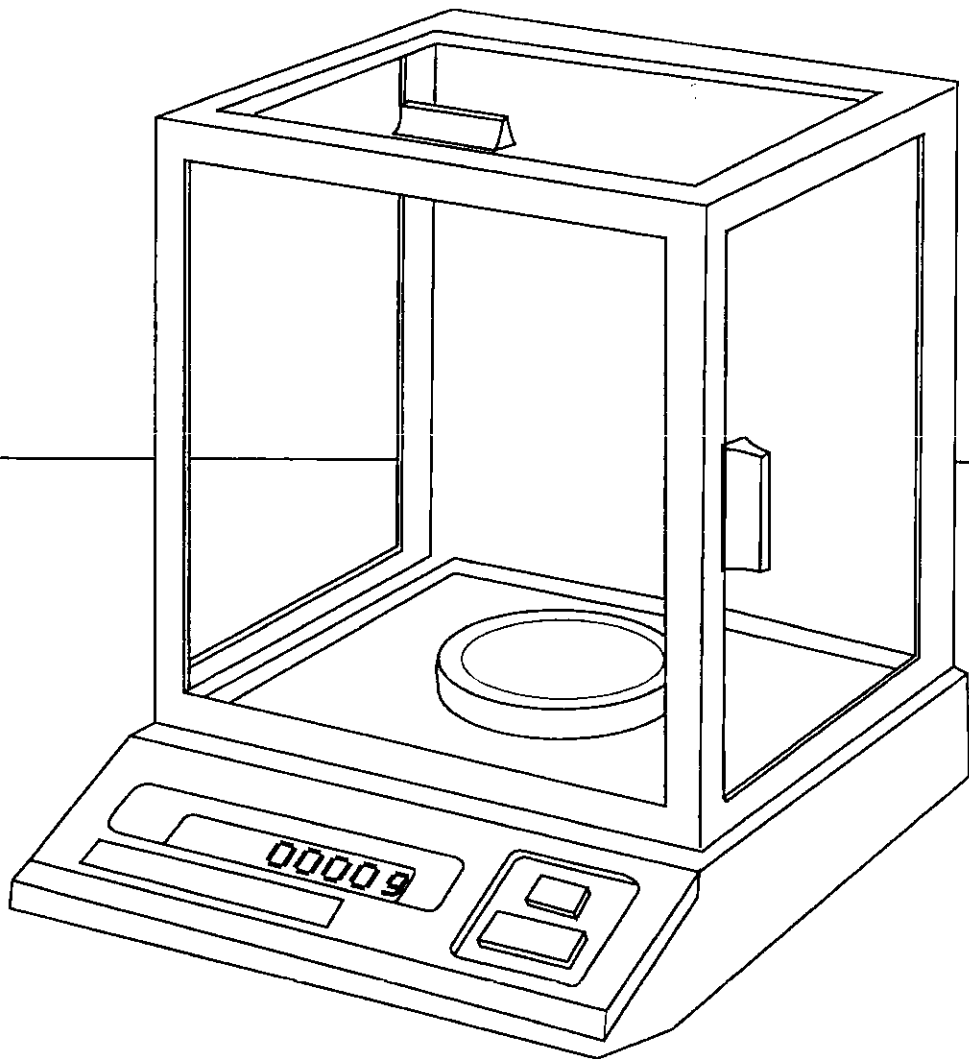


# **XE-50 & XE-100 TOPLOADING BALANCES**

## **Operating Instructions**



601919.1  
REV. B

**XE-50 MODEL SPECIFICATIONS**

Capacity ..... 50g  
Readability ..... 0.0001g  
Repeatability ..... 0.0001  
(Std. Dev.)  
Linearity ..... ± 0.0002  
Response Time  
(Avg.) ..... 4 sec.  
Pan Size ..... 3 1/4" (8.3cm)

See page 6 for additional modes and specifications.

**XE-100 MODEL SPECIFICATIONS**

Capacity ..... 100g  
Readability ..... 0.0001g  
Repeatability ..... 0.0001  
(Std. Dev.)  
Linearity ..... ± 0.0002  
Response Time  
(Avg.) ..... 4 sec.  
Pan Size ..... 3 1/4" (8.3cm)

See page 6 for additional modes and specifications.

**DISCLAIMER NOTICE**

"Calibrate your balance using reference weights of the appropriate tolerance (class). An instrument can be no more accurate than the standard to which it has been compared. For assistance in the selection of reference weights, please contact the factory."


**Class A Digital Devices:**

**NOTICE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designated to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

**CAUTION:** Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

Read all instructions prior to operating your balance! Remember, this is a precision weighing instrument and should be handled with care.

Manufactured by:

 **Denver Instrument Company**

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303/431-7256 • 1-800-321-1135 • FAX 303-423-4831

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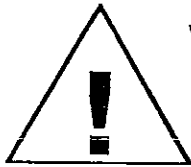
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## **INTRODUCTION**

Thank you for choosing one of our precision balances! Your balance has been carefully designed and constructed for easy operation and proven durability.

- First, check the contents of the shipping carton. You should find the following items:
  - Manual
  - Balance
  - Weighing Pan
  - Wall Mount Power Supply
- Next, follow the instructions for selecting a location and installation on the following page.
- Finally, take advantage of the many features of this unit, by carefully reading your operations manual. It contains step-by-step procedures, examples, and other important information.



**WARNING!** Use of this product in a manner not specified by the manufacturer may impair any safety protection provided by the equipment!

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## ***Preparation***

Select a suitable work area.

To ensure trouble-free operation and reliable results, set up your balance in an area that meets the following guidelines:

1. This product is intended for indoor use.
2. Work area should be free from drafts and vibrations.
3. Work surface should be level and rigid.
4. Line voltage to the balance should be within 10% of the nominal specifications. (See Appendix C.) It is **not** advisable to use an outlet that is shared with fluorescent fixtures or other electrical equipment that draws current in an inconsistent manner.
5. Do **not** locate near magnetic materials or equipment that incorporate magnets in their design.
6. Avoid areas which have variations or excessive room temperatures. Room temperatures above 105°F/40°C or below 60°F/15°C could affect balance operation and accuracy.

## ***Equipment Installation***

1. Remove the balance and all accessories from the carton. There are no "tie downs" inside the balance.
2. Level the balance by using the level bubble located on back of the balance and the leveling feet located underneath the base.
3. Place the weighing pan on the balance.
4. Insert the power cord into the receptacle located on the rear panel of the unit. Firmly push in the plug.
5. Plug the wall transformer into an outlet of the correct voltage. Allow 30 minutes for the unit to warm up.
6. **Do not** unplug your balance! This balance is designed to be continuously plugged into the power supply at all times.

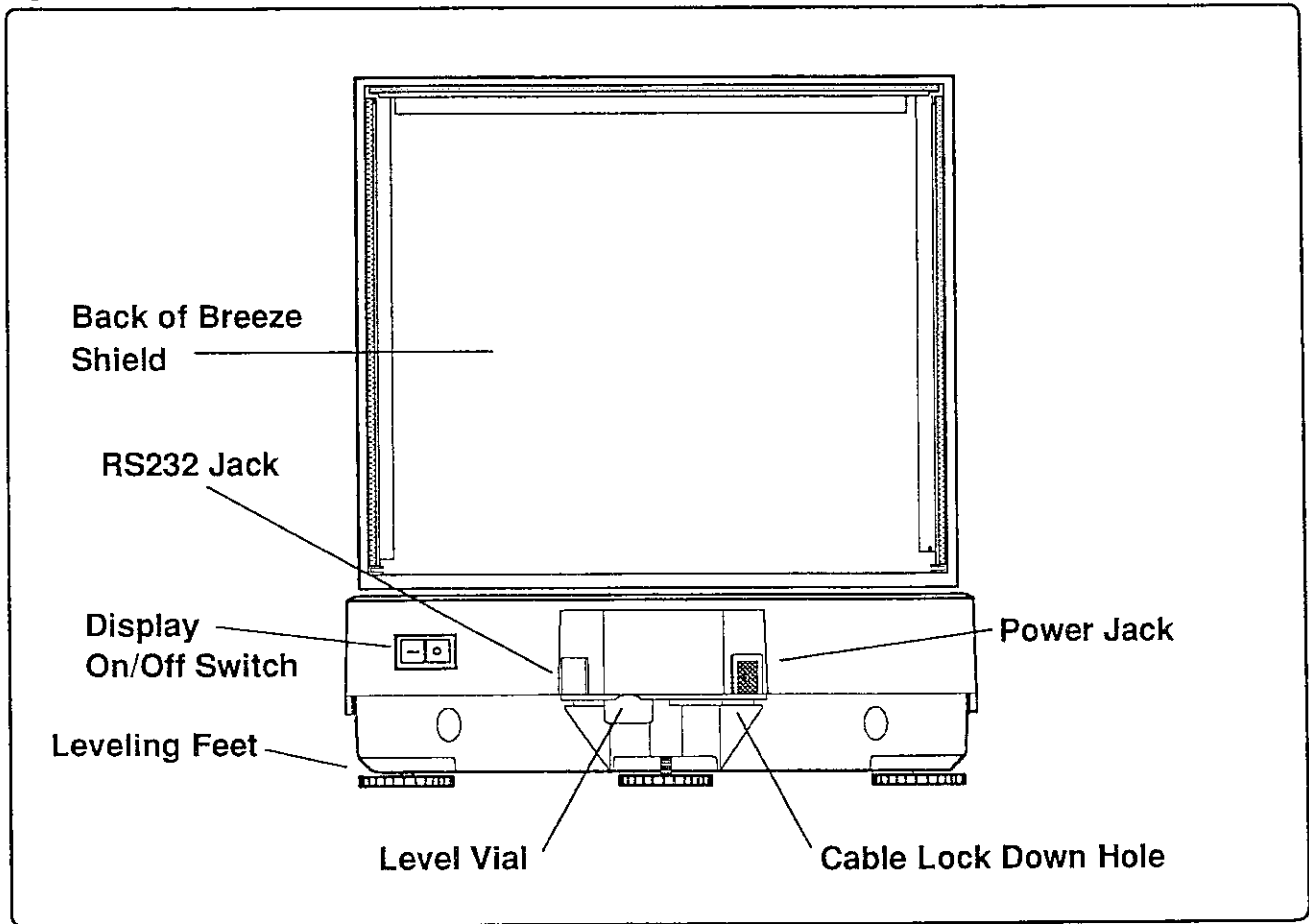
## ***Balance Calibration***

**The XE Balance is calibrated at the factory prior to shipment. However, you should calibrate your balance before using it for the first time, and you should periodically check calibration to ensure accuracy.** We recommend that you check the calibration once a week, or whenever the balance has been moved to a different location, or excessive temperature variations have occurred. Calibration weights are available from your sales representative. See the Calibration Weight chart on the following page, for permissible gram weights.

### **Procedure:**

1. Remove all weights from pan.
2. Press the **ZERO** key. The balance will display: **0.0000**

Figure 1 - REAR OF BALANCE



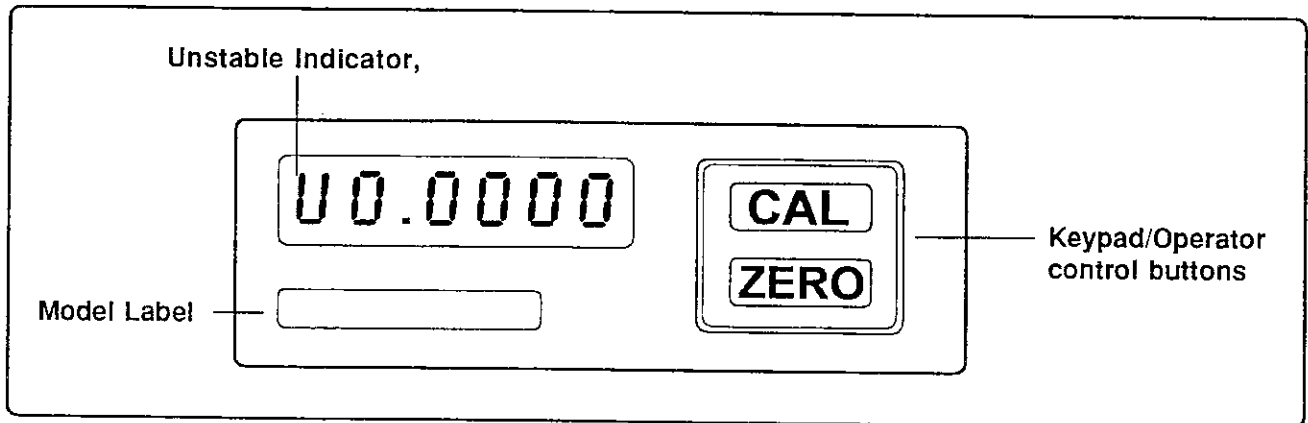
3. Place the calibration weight on the pan.
4. Press the **CAL** key. The balance will display either **CAL -20-**, **Cal -30-**, **-Cal -50-** or **Cal -100-** depending on the selected calibration weight.
5. When calibration is complete, the balance will display either: **20.0000g**, **30.0000g**, **50.0000g** or **100.0000g**.
6. Remove the weight.
7. If there is an unsuccessful calibration routine, the balance will display: **NO CAL**. This may occur, for example, if an incorrect calibration weight has been used. If necessary, repeat the steps 1 - 5 with a correct calibration weight.

Permissible Calibration Weights

	Capacity	Permissible weights
Model: XE-50	50g	20g, 30g or 50g
Model: XE-100	100g	20g, 30g, 50g or 100g

We recommend that calibration be performed using the permissible weight that approximates your normal weighing range.


**Figure 2 - Front Panel Display**



**Common Specifications for All Models**

Dimensions:.....8 ½" x 10" x 10 ½" (22 x 26 x 26.5cm) (L x W x H)

Net Weight: .....7 lb. (3.2kg)

Electrical Requirements:..... 12VDC  @ 500 mA

The Model XE-50 & XE-100 may be ordered with 230 NA, 230 UK and 230 EUR plugs. Contact your nearest distributor for further information.

## **BALANCE OPERATION**

### **A. ZERO (TARE)**

The **ZERO** key zeroes (tares) the balance.

To **Zero (tare) the weight of a container:**

1. Place the empty container on the weighing pan and allow the balance to stabilize. (The balance is stable when the unstable indicator " U " at the left of the display disappears.)
2. Press the **ZERO** key. The balance will display 0.0000.
3. Now place the sample in the container. The balance will display only the weight of the sample.

**NOTE:** Always wait for the unstable indicator to disappear before taking a reading.

## **I/O APPLICATIONS**

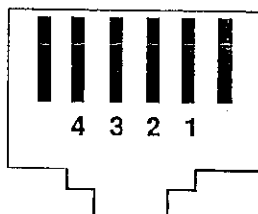
**NOTE:** Improper connections to the Input/Output (I/O) may result in damage to the balance.

### **Technical Specifications**

Connector: RJ-11, 6 position, 4 conductor, modular telephone jack.

#### **RJ-11 (4) CONNECTOR**

**Figure 5: Pin Assignment on Back of Balance - left to right:**



4 - ZERO (TARE)  
3 - DATA OUT  
2 - DATA IN  
1 - GROUND

### **SIGNAL DEFINITION**

This balance uses an RS-232C level compatible interface, with 8 data bits and null parity.

Data Output: Voltage output is compatible with RS-232C levels, 300 Ohm source resistance and  $\pm 8$  volt swing minimum.

Data Input: Voltage input compatible with RS-232C levels, 3000 Ohm input impedance,  $\pm 5$  volt minimum swing,  $\pm 20$  maximum voltage.

### **OUTPUT SPECIFICATIONS**

Data from the balance is transmitted in a similar format to that displayed on the front panel of the balance. For example, a typical string is:

1+00012.3g      1+0000.0000 <CR> <LF>

Each weight reading is followed by a carriage return and a line feed. If the

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reading is negative, a " - " will precede the numerical value instead of the " + " symbol.

## I/O SPECIFICATIONS

It is important for the user to determine interface requirements of equipment connected to the balance. The maximum recommended cable length is 10 feet. The information is transmitted at a baud rate of 300 in standard ASCII format.

## I/O COMMANDS

It is possible to control the balance from a terminal or computer with RS-232C interface and baud rate of 300. The following UPPER CASE commands can be used. Some commands must be followed by a carriage return, as noted by <cr>. The symbol # designates a number following the command letter. See command definitions below and on following page. Factory Default settings are in italics.

**T** Immediately zeroes (tares) balance to zero.

**?#** Prints the data a specific number (#) of times.  
This number (#) can be 0 to 9. If a number 1 through 9 is selected and the balance is unstable, the balance will wait for a stable condition before sending the data. For example, if " ?4 " is transmitted to the balance, four consecutive, stable weight readings are output from the balance in the format specified in I/O Commands above.

If the number (#) is zero, the balance will continuously output weight readings, whether the balance is stable or not. If a reading is unstable, a " U " symbol will precede the weight value.

**F#** Function select. The balance goes into the function number # chosen from the table below. It is not necessary to remove the weight or tare when changing functions.

SYMBOLS DISPLAYED		
FUNCTION #	ON BALANCE	NAME
0 .....	P .....	Parts Count
1 .....	g .....	Gram
2 .....	C .....	Carat
3 .....	d .....	Pennyweight(dwt)
4 .....	A .....	Av Ounce
5 .....	o .....	Troy Ounce
6 .....	G .....	Grain
7 .....	t .....	Tola
8 .....	M .....	Momme
9 .....	S .....	Teal (Singapore)
A .....	H .....	Teal (Hong Kong)
B .....	T .....	Tael (Taiwan)

---

**CAL**     The calibrate command allows the user to re-calibrate the balance  
<cr>     using the allowed calibration weights. To use, place the calibration  
weight on the pan and send the calibrate command. See Calibration  
section.

**SU**     **SET UP Command**  
Allows user to access Set Up

The following commands are only active in the Setup menu:

**D**     **Default Values.**  
Sets units to default values and then exits. (Default settings are in bold  
text below.)

**F#**     Sets filter integration speed and then exits using a hex number (1-9,  
A-F) with 1 being fastest, **4** being the standard and F being the slowest.  
With this setting, it is possible to optimize the balance response to  
compensate for varying conditions, including vibrations or drafts. It  
is recommended trying various filter settings to determine the most  
suitable setting in relation to your environment and/or usage.

**Filter**     Used under ideal conditions; provides the fastest response (1-3) time.  
**Fast**     At this **Fast** setting, the balance is much more susceptible to vibrations  
and drafts.

**Filter**     Used under standard lab conditions; operates at moderate speed.  
**Normal**     (**4**).

**Filter**     Used in areas with vibrations and drafts; averages more readings  
**Slow**     at a **Slow** slower rate (6-9, A-F).

**Z#**     Sets auto zero (zero tracking) and then exits  
0 - Turns auto-zero off

1 - Sets auto-zero at 1/2 count

**2 - Sets auto-zero at 1 count**

This setting is designed to help maintain a zero display reading (when  
the balance has been tared to zero in a less than ideal weighing  
environment. This feature automatically returns a zero reading when-  
ever the balance is within these parameters.

For example: If the 1/2 count is selected, the balance will hold zero  
setting to within  $\pm 0.00005g$ .

**B#**     Sets rate at which data is input to and from the balance and then  
exits. This setting lets you select the baud that matches the setting on  
the printer or computer that you are using with your balance.

1 110 baud    4 1200 baud

**2 300 baud**    5 2400 baud

3 600 baud    6 4800 baud

**X**     Exits from Set Up menu

---

## Linearity

Table - Linearity Weights

<u>Model</u>	<u>Weight #1</u>	<u>Weight #2</u>
XE-50	20g	30g
XE-100	50g	50g

You can use these recommended weights, or any 2 weights that equal the capacity of the balance.

1. Hold the **CAL** and the **Zero** Key. "LIN 1" will be displayed.
2. Press the **CAL** key. The display will show "LIN 2".
3. Place weight #1 from the above table on the pan. Let stabilize and press the **CAL** key. The display will show "LIN 3".
4. Remove weight #1 and add weight #2. Press the **CAL** key when stable. The display will show "LIN 4".
5. Add weight #1 to the pan with weight #2. Press the **CAL** key when stable. The display will show "LIN 5" followed by "L XXX", then return to the Weighing screen.
6. Calibrate the balance prior to operation.

---

## **APPENDIX A - Glossary of Terms**

### **Calibration**

Comparison of a measurement standard or instrument of known accuracy with another standard or instrument to detect, correlate, report, or eliminate by adjustment, any variation in the accuracy of the item being compared.

### **Capacity**

The maximum operation limit or load that may be applied to the balance.

### **Linearity**

Determination of an instrument's accuracy throughout its' entire operating range.

### **Readability**

The smallest increment that a balance is able to display.

### **Re-zero**

Returns balance to zero setting using the **ZERO** key.

### **Set Up**


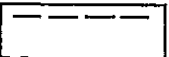
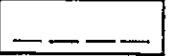
The process of configuring the balance to operate in a certain way.

### **Unstable Indicator**

A "U" symbol that is automatically displayed when the reading is not stable. It disappears when the reading becomes stable.

## APPENDIX B - Troubleshooting Guide

**NOTE:** *This unit contains no user serviceable parts.*

If Display Shows:	Possible Causes:	Remedies:
 <b>Blank Screen</b> (Nothing is displayed)	Power cord not connected. No power to outlet or Improper voltage. Temporary fault.	Connect cord. Check power supply . Disconnect/Reconnect power cord. (Wait 5 seconds before reconnecting).
 over   under	Weight beyond capacity. Pan not properly installed. Pan obstructed.  Broken Mechanics	Reduce weight. Install properly. Move balance.
<b>Display is Unstable</b>	Air movement around balance  In-use cover touching pan. Unstable location. Sample not stationary.	Use draft shield. Adjust In-use cover. Relocate balance. Make sample stationary.
<b>NO CAL</b>	See Calibration Section.	
<b>Error</b> <b>Pan obstructed</b>	Pan and sub-pan removed. Remove obstruction.	Install properly.

For service contact your sales representative or call the phone number listed on the inside back cover of this manual.

### Cleaning Instructions:





The exterior surfaces of the product may be cleaned with a mild water-based detergent and a lint-free nonabrasive cloth. Alternatively, isopropyl alcohol may be used. Do not immerse the product in any liquid.

## APPENDIX C - Accessories and Replacement Parts

<u>Part No.</u>	<u>Part Name</u>	<u>Description</u>
36800110.1	Lock-Down Device	Allows secure attachment of balance to table top. Two steel cylinders, bolts, and keys are included. Bolts through tabletop from underside into base of balance. Cylinders cover bolt heads. Drilling template provided. Cable-type lock-down device also available.
77000440.8	Weigh-Below Assembly	Allows weighing below balance for specific gravity determination. Consists of threaded rod, hook, and hanging pan.
900027.1	12V Automobile Lighter Adapter	Requires 12VDC negative ground, 6' (1.8m) long cable.
00009004.1	Battery Pack	Rechargeable.

### External Transformers for Models XE-50 & XE-100

\*As specified below, one of the following external transformers is included:

part#	input	output	mains plug type
100126.1	115V ~, 50/60 Hz	12 V  , 500mA	North American NEMA 5-15p
100220.1	230V ~, 50/60 Hz	12 V  , 500mA	North American NEMA 5-15p
100345.1	230V ~, 50/60 Hz	12 V  , 500mA	Continental European CEE 7/16
100346.1	230V ~, 50/60 Hz	12 V  , 500mA	United Kingdom BS 1363

***NOTE: Other mains connection plug configurations may also be available. Contact your sales representative.***

All replacement parts should be obtained from the manufacturer.