equipoise

Compact Balance

Technical Manual

RICE LAKE
WEIGHING SYSTEMS

PN 129541 Rev D

Contents

1.0 Introduction

The *Equipoise* balance amplifies signals from a load cell, converts it to digital data and displays it as a mass value. It is an accurate, fast and versatile series of general purpose balances with counting and percent weighing functions.

Other features include:

- 25 mm LCD with black backlit display
- Keypads are light touch switches
- Battery provides up to 40 hours of continuous use (without backlight)
- Capacity 300 g (.661lb) to 3000 g (6.613 lb).

All units include automatic zero tracking, automatic tare and an accumulation facility which allows the count to be stored and recalled as an accumulated total.

This manual can be viewed and downloaded from the Rice Lake Weighing Systems website at: www.ricelake.com

Warranty information can be found on the website at www.ricelake.com/warranties

1.1 Safety

Safety Symbol Definitions

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death, and includes hazards that are exposed when guards are removed.

Important

Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

Safety Precautions

Do not operate or work on this equipment unless you have read and understand the instructions and warnings in this manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals. Proper care is your responsibility.

General Safety

WARNING

Failure to heed may result in serious injury or death.

Some procedures described in this manual require work inside the indicator enclosure. These procedures are to be performed by qualified service personnel only.

Before opening the unit, ensure the power cord is disconnected from the outlet.

Disconnect all power to this unit before installing, cleaning or servicing.

Do not allow minors (children) or inexperienced persons to operate this unit.

Do not operate without the enclosure completely assembled.

Do not use for purposes other than weight taking.

Do not place fingers into slots or possible pinch points.

Do not use this product if any of the components are cracked.

Do not exceed the rated specification of the unit, see Section 9.17 on page 74.

Do not make alterations or modifications to the unit.

Do not remove or obscure warning labels.

Do not submerge.

Important

The balance is a precision electronic instrument. Handle it carefully.

Do not install the balance in direct sunlight.

Verify that the local voltage and receptacle type are correct for the balance.

Only use original adapter. Others could cause damage to the balance.

Balance should be located in an area near an easily accessible socket outlet.

Avoid unstable power sources. Do not place near equipment such as welders or large motors that use large amounts of electricity

Avoid sudden temperature changes, vibration, wind and water.

Avoid heavy RF noise.

Keep the balance clean.

1.2 Description

Keyboard

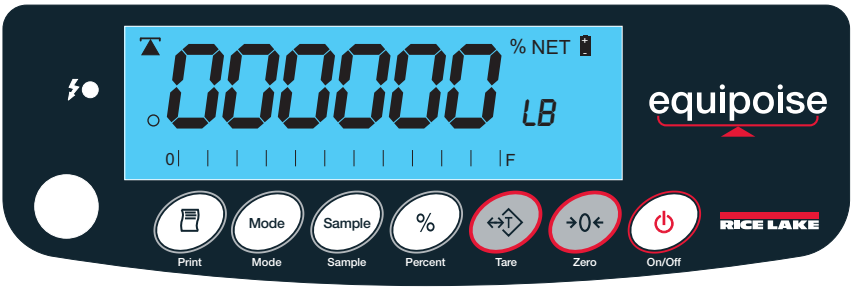


Figure 1-1. Equipoise Overlay

Key	Description
On/Off	Turns the balance power On / Off
Tare	Subtracts weight of container
Zero	Sets display to Zero
% Percent	Set percentage weighing function
Sample	Set to counting mode

Key	Description
Mode	Set to weighing units
Print	Recalls Memory/Print the results
▲	Standstill Indicator
○	Zero Indicator
NET	Tare Indicator
%	Percent Weighing Indicator
+ −	Battery Indicator

Table 1-1. Key and Display Description

2.0 Installation

2.1 Unpacking

Use the following instructions to unpack and inspect the balance.

1. Remove the weighing balance from the carton.
2. Remove the protective covering.
3. Inspect the balance and terminal for damage.
4. Make sure all components are included.

Components

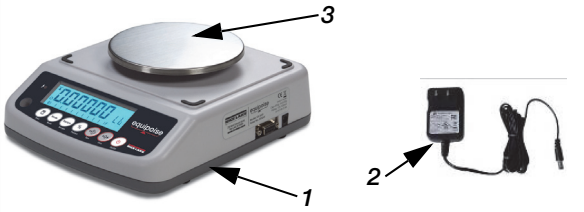


Figure 2-1. Component Parts

Item No.	Description
1	Balance
2	Adapter
3	Pan

Table 2-1. Component Parts List

Air Protection Case

The air protection case is used to protect the balance from air variations while weighing and is available with light capacity balances only. Carefully secure glass sides 2 & 4 with poles.

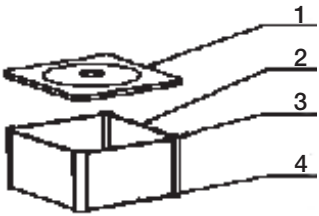


Figure 2-2. Air Protection Parts

Item No.	Description
1	Air Case Top Cover

Item No.	Description
2	Glass Side-1 covers x 2
3	Pole of glass
4	Glass Side-2 covers x 2

Table 2-2. Air Protection Parts List

2.2 Battery Charging

The balance can be operated by battery if desired. Battery life is approximately 40 hours for continuous use without a backlight.

When the battery needs to be charged, the battery indicator ( ) will turn on.

1. To charge the battery, insert the adapter pin into the jack, located on the right side of the balance.
2. Plug the balance into a power source. The balance does not need to be turned on. The battery should be charged for 12 hours for full capacity.

There is an LED to indicate the status of the battery as it is charging. When the balance is plugged in, the internal battery will be charged.

The color of the LED indicates the following:

- **Green** — battery has a full charge
- **Yellow** — battery is nearly full of charge
- **Red** — battery is being charged

Figure 2-3. LED Light Display

Do not use any other type of power adapter than the one supplied with the balance.

Verify that the AC power socket outlet is properly protected.

Note ***Charge the battery before using the balance for the first time.***

As the battery is used, it may fail to hold a full charge. If the battery life becomes unacceptable, contact your distributor.

2.3 Setting Up The Balance

1. Place the balance on a table or another flat surface.
2. Plug the adapter pin into the balance adapter jack, located on the right side of the balance.
3. The adapter plugs into an AC power outlet. The balance should be located near an easily accessible socket outlet with a protective ground/earth contact.
4. Press the **On/Off** key to turn on the power. Press the key again to turn off the power.
5. The display will show the version number and will begin a self test.
6. When the self test is complete, the normal weighing mode will be displayed.
7. A warm-up time of 15 minutes stabilizes the measured values after switching on.

Figure 2-4 Jack Location

8. Calibrate with exact calibration weights. A minimum of 1/3 of the balance capacity should be used for calibration. See details in Section 4.1 on page 11. The balance is now ready for use.

2.4 Level Adjusting

1. Place the balance on a table or another flat surface.
2. Check the bubble level. If bubble is not centered, adjust the leveling feet until it reaches the center.

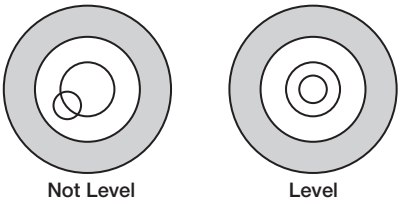


Figure 2-5 Bubble Level

Note ***Always re-check the level when changing the location.***

3.0 Operation

3.1 Initial Start-up

Warm up time of 15 minutes stabilizes the measured values after switching on.

3.2 Power On/Off

1. Press 

to turn the balance on. The self test will start.
2. Press 

again to turn balance off.

3.3 Zero

Environmental conditions can lead to the balance not reading zero in spite of the pan not taking any strain.

Press 

to set the display to zero.

3.4 Tare

The weight of any container can be tared (subtracts the weight of the container and zeros the balance) so that with subsequent weighing the net weight of the object being weighed is always displayed.

1. Place a container on the pan.
2. Press 

. Tare is subtracted and zero is displayed. When the container is removed from the platform, the tared weight is displayed as a negative value.
3. Press 

again to clear the tare.

3.5 Weighing Units

Press 

in the weighing mode to change the unit of measure:

Unit Mark	Unit Name	Conversion (g)
g	gram	
ct	net carat	0.2g
Lb	pound	453.59237g
OZ	ounce	28.349523125g
d	dram	1.7718451g
GN	grain	0.06479891g
OZt	troy ounce	31.1034768g
dWt	penny weight	1.55517384g
MM	momme	3.749996g
TLT	tael twn	37.49995g
TLh	tael chn	37.799375g
TLJ	troy tael	37.4290018g
t	tola	11.6638039g
bt	bangladeshi tola	1bt=11.6638039g 1bt=16Ana=96Roti
N	newton	1N=101.916g

Table 3-1. Weight Unit List

Units can be set to On/Off in the parameters settings. See Section 5.2 on page 12. If Unit is set to off, it will not show when pressing the Mode key.

3.6 Percent Weighing

The balance can set a base weight to be shown as 100 percent. Then when other weights are placed on the balance, it will be displayed as a percentage of the original base weight.

For example:

1. Place base weight on the balance.
2. Press 

. The display will show 100.00 percent.
3. Remove the weight and wait for the display to return to zero.
4. Place the weight you want to compare to the base weight on the platform. The display shows what percent the current weight is of the base weight.
5. The weighing may be amended on the basis of greater numbers of samples and may improve the accuracy of percentage of large quantities.

3.7 Parts Counting

1. Press 

to enter the parts counting mode.
2. Select the sample count by pressing 

until the desired count is shown. Place selected quantity of product on the balance.

Display	Count number
sp 10 pcs	For 10 pieces
sP 20 pcs	For 20 pieces
sP 50 pcs	For 50 pieces
sP 100 pcs	For 100 pieces
sP 200 pcs	For 200 pieces

Table 3-2. Display/Count

3. Press 

to confirm.
4. Add more items. The weight display will show the total number of parts.
5. Press 

to exit counting mode.

Note ***The balance retains the sample rate until exiting the counting mode.***

3.7.1 Parts Counting With A Container

1. Place a container on the platform.
2. Press 

to zero the balance.
3. Select the parts quantity as shown in Table 3-2 .
4. Place the specified number of parts in the container.
5. Press 

to confirm. The display will show ---- then the quantity.
6. Add product on the platform. The display will update the parts quantity automatically to total number of parts in the container.
7. Press 

to exit counting mode.

3.8 Accumulation

Before setting the balance to accumulate, it should be stable (⏢) and the display should be at zero (○). Accumulation is available only when weight is more than 20 divisions (or 20 times the resolution of the balance).

Accumulation Operation

1. Place the load on the platform.
2. When the stable indicator (⏢) is displayed, press 

.
3. The display will show ACC x (x = total number of accumulations) for three seconds.
   The total saved value will then display for three seconds.

Note ***If the optional RS-232 interface is installed, the weight data will be sent to the printer.***

4. Remove the weight from the pan.
5. When the display returns to zero and the stable (◣◢) indicator is shown, place another weight on balance.
6. Repeat steps 2-5 for all items to be weighed.

Note ***Display will show*** ADDERR ***when memory is full.***

3.8.1 Memory Recall

To recall the memory, press 

.

Display will show ACC x (x = total number of accumulations) for three seconds.
The total saved value will then display for three seconds.

3.8.2 Memory Clear

To clear the memory:

1. Press 

.
2. While accumulation is displayed, press 

.
   The display will return to normal mode; all accumulated memory will be cleared.

4.0 Calibration

4.1 Normal Calibration

1. Press and hold 

to enter calibration. unload is displayed.
2. Remove any weight from the platform.
3. After the stable indicator (⏢) is displayed, press 

to confirm. Load will display.
4. Place the calibration weight (1/3 of the capacity) on the platform.
5. When the scale is stable, press 

key to confirm.

4.2 Linear Calibration

1. Turn on the balance. Press 

during the self test. F1 UNT will display.
2. Press 

several times to scroll to tech, then press 

to enter calibration. PI N will display.
3. Press 

in sequence. P 1 LIN will display.
4. Press 

to enter calibration. PI N will display.
5. Press 

in sequence. load 0 will display.
6. Ensure the platform is empty. After the stable (⏢) and zero (○) indicators come on, LOAD 1 will display.
7. Place the first calibration weight (1/3 of the capacity) on the platform. After the stable (⏢) and zero (○) indicators come on, load 2 will display.
8. Place the next calibration weight (2/3 of the capacity) on the platform. After the stable (⏢) and zero (○) indicators come on, load 3 will display.
9. Place the last calibration weight (full capacity) on the platform. After the stable (⏢) and zero (○) indicators come on, the balance will start self test and return to normal weighing mode.

5.0 Parameter Settings

5.1 Enter Parameter Settings

1. Press 

to turn the balance on.
2. Press 

during the self test to enter parameter settings mode.
3. Press 

to scroll to desired parameter.
4. Press 

to enter parameter and scroll through choices.
5. Press 

to change setting.
6. Press 

the screen will display EX F1.
7. Press 

to return to weighing mode.

5.2 Set Weighing Unit

Enter parameter settings (see Section 5.1).

1. At *F1 unt*, press 

to enter unit settings.
2. Press 

to set each unit to **On/Off**.
3. Press 

to advance to the next unit.
4. After all units have been set, press 

to return to weighing mode.

5.3 Set Backlight

Enter parameter settings (see Section 5.1).

1. At *F2 El*, press 

to enter backlight setting.
2. Press 

to select backlight mode. See Table 5-1 on page 14.
3. Press 

to accept.
4. Press 

to return to weighing mode.

When the battery is low, the backlight function is not available.

5.4 Communications

1. At *F3 Con*, press 

to enter the communications setting.
2. Press 

to modify the print setup. See Table 5-1 on page 14.
3. Press 

to accept the baud rate settings.
4. Press 

to toggle between choices.
5. Press 

to select printer.
6. Press 

to toggle between TP (tape printer) and LP-50 (not used).
7. Press 

to accept.
8. Press 

to return to the weighing mode.

Menu	Sub Menu		Description
F1 unt	g / ct / lb / oz / d / gn / ozt / dwt / mm / tl.T / tl.c / tl.t / t,.		Each unit can be set to on or off.
F2 el	El au	On	When weight is on the pan, the backlight will turn on.
		Off	
	El on	On	Backlight is always on when the balance is turned on.
		Off	
	El off	On	Backlight is always off when the balance is turned on.
		Off	
F3 com	P prt		By pressing the **Print** key, the weighing value will be added to the memory and sent to the printer if connected.
	P cont		Sends data continuously.
	P auto		Automatic accumulation — Individual weighing values are automatically added.
	Set BAUD rate: After setting the RS-232 mode, the display will be shown with the current baud rate **b XXX**. Baud rate Options: **b600, b1200, b2400, b4800** and **b9600**		
	Set Printer type: After setting the BAUD rate, the display will show the printer type.		
	Lp 50		Not available
	Tp		Ticket printer
F4 ACC	ACC ON		Turn on accumulation.
	ACC OF		Turn off accumulation.
tech	pin		Factory access only
P 1 lin			Linear calibration
P 2 Cal			Normal calibration
P 3 cnt	xxxx		This display will display XXXXX for indicating the internal counts.
P 4 a 2n	0 .5 d		Set auto zero
	1 d		
	2 d		
	4 d		
P 5 gra	Xxxx		Set local gravity

Table 5-1. Parameter Settings

6.0 RS-232 Output

6.1 Specifications

- RS-232 output of weighing data
- ASCII code
- 600~9600 baud
- 8 data bits
- No parity

6.2 RS-232 (9-pin D Type Connector)

Pin	Signal		Description
Pin 2	RXD	Input	Receiving data
Pin 3	TXD	Output	Transmission data
Pin 5	GND	--	Signal ground

Table 6-1. 9-Pin Connector Types

9-pin D Connector:

Balance	Computer / Printer
Pin 2:	Pin 3
Pin 3:	Pin 2
Pin 5:	Pin 5

Table 6-2. Balance to Printer Connector

Continuous Output Protocol (Weighing Mode)

S	T	,	G	S	-/								k	g	CR	LF
Header 1			Header 2			Weight Data							Weight Unit		Terminator	

Table 6-3. Continuous Output Protocol

6.3 RS-232 Serial Commands

1. R= Send
2. T= Tare
3. Z= Zero

7.0 Maintenance

7.1 General

Use the following instructions to complete general maintenance on the Equipoise balance.

7.1.1 Balance Does Not Operate Properly

Determine whether the problem is constant or alternate. Be aware that problems can be caused by mechanical or electrical influences.

Check for the following:

- Water
- Corrosive materials
- Vibrations, temperature or wind
- Physical damage

Check the balance cables for damage. Check all connections and connectors for any loose contact or incorrect connection.

7.1.2 Cleaning

Use the following instructions to clean the Equipoise:

- Disconnect the power before cleaning.
- Use a clean and soft cloth with mild cleaning agents.
- Make sure that the fluid is not able get into the device.

7.2 Error Codes

Error Code	Description	Possible Cause	Solution
Err 1	Date set error	--	Check the input data
Err 2	Time set error	--	Check the input data
Err 3	Calibrationweight is too light	--	Check the calibration weight
Err 4	Zero range exceeded, due to turning on or by pressing 	Goods on the platform overloaded, when zeroing the balance Improper calibration Load cell problem PCB problem	Remove good from the platform.
Err 5	Keyboard error	Holding a key over 30 seconds	Press the key for shorter length of time.
Err 6	A/D Count out of the range	Platform is not installed Load cell problem PCB problem	Re-install platform. Check the load cell.
Err 7	Pecentage setting error	--	0.01% weight must be >0.5d
Err 8	External calibration weight error	More than 4% error as linear calibration	--
Err 9	Unstable, can't perform zero or tare	--	--
Err 10	No data	RS-232, continous communication	--
Err 11	Won't accept communication protocal	Can get signal, but can't support	--
Err 12	Accumulation error	Max accmulate time 999 or total weight 999999 has been reached.	--
Err 13	Lack of unit weight	Counting: unit weight < 0.5d	--
Err 14	Lack of sample	Counting: sample weight < 20d	--
Err 15	Error gravity value setting	Gravity value range 0.96-1.04	--

Table 7-1. Error Codes

Error Code	Description	Possible Cause	Solution
Err 16	No paper	--	--
Err 17	Tare Operation	Minus weight or overload	--
Err 18	Incorrect pre-tare operation	Minus weight or overload	--
Err P	Printer no response two seconds later	--	--
OK	Set password OK	--	--
PASS	Calibration OK	--	--
Fail	Calibrate or password setting fail	--	--
NG	RS-232 Command error	--	--
--OL-	Overload	Max +9d (NTEP: 105% capacity)	--
--LO-	Minus weight	-5% capacity	--
Bat lo	Battery voltage too low	<5.9v	--

Table 7-1. Error Codes

Measuring Points	Resistance
Red (+ Exc) to White (–Exc)	420 ±20Ω
Green (+Sig) to Black (–Sig)	350Ω ±5Ω

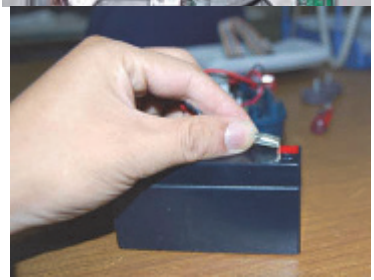
Table 7-2. Measuring Points

7.3 Replace Battery

Use the following steps to replace the battery.

1. Remove the pan**.**
2. Remove the top cover.
3. Remove the two screws from the battery clamp.
4. Remove the connectors from the battery terminals.
5. Remove the used battery and replace with a new a battery.

6. Connect the connectors to the battery terminals.
7. Install the two screws to secure battery clamp.
8. Install top cover and pan.
9. Turn on the balance.
10. Charge the battery before using the balance for the first time.



8.0 Troubleshooting

Problems	Possible cause	Common Solutions
Display is blank. No self test.	Main power is turned off. Power supply faulty or not plugged in. Internal battery is not charged. On/Off switch is faulty.	Ensure there is power to the balance and that the on/off switch is working. Verify the voltages, which are located on the power labels.
Blank display after self test	Pan not installed Unstable weight Load cell damaged	Ensure the pans are installed correctly. Try to turn on the balance again.
OL or -------	Maximum capacity exceeded Load cell or mechanics damaged Power supply faulty	Ensure the platform is installed correctly. Try to turn on the balance again. Do the calibration again.
------- or NULL	Weight is on the platform is below permissible limit. Pan not installed correctly. Power supply faulty. Load cell or mechanism faulty	Ensure the platform is installed correctly. Try to turn on the balance again. Do the calibration again.
Display is unstable	Goods touching somewhere. Air variation or any vibrations. Temperature changed . Load cell or connections faulty. Power supply faulty	Ensure the balance is in acceptable location. Check the connecters and load cell. Check the power supply and battery
Weight value incorrect	Calibration error. Platform of load cell touching somewhere. Wrong weighing unit	Use accurate weight for doing the calibration. Ensure the pan and load cell are properly installed and are touching. Check the parameter settings. Check the load cell and connecters.
Cannot use full capacity	Over load protection stoppers or transport locks are not removed. Parameters are set incorrectly. AD problem. Load cell or mechanism damaged	Check the stoppers and locks under the platform. Check the weighing unit and parameter settings. Check the load cell.
Platform Corner Weight different	Over load protection stoppers or transport locks are not removed. Load cell or mechanism damaged	Check the stoppers and locks under the platform. Use accurate weight for doing the calibration. Check the load cell.
Battery is not charging	Main voltage problem Charging circuit problem Battery Problem	Check the main voltage and adapter. Check the battery. Check the charging circuit.

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