

9. OPTIONS

The following options are available for the EJ-123/EJ-303 balance:

- EJ-02 USB interface
- EJ-03 RS-232C serial interface
- EJ-13 Density determination kit

□ **Note**

The EJ-123/EJ-303 balance have only one option slot for a communications interface. Either the EJ-02 USB interface or the EJ-03 RS-232C serial interface can be installed at one time.

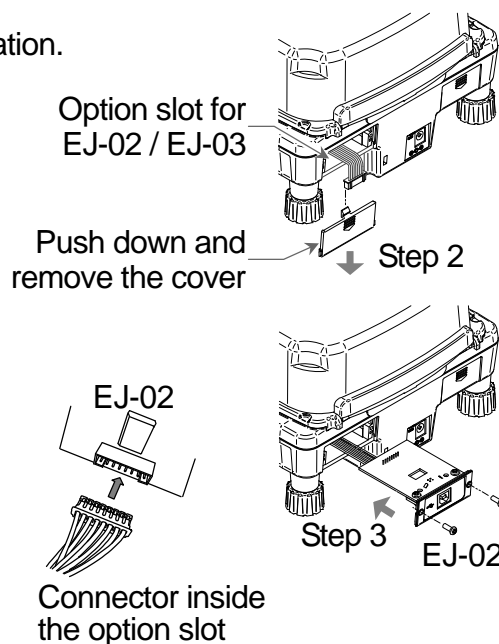
9.1. EJ-02 USB Interface

The EJ-02 allows an EJ-123/EJ-303 balance to be connected with a printer or a personal computer with the USB interface.

- The EJ-02 can transmit the weight value (numerical value only) uni-directionally to a personal computer via USB.
- The EJ-02 can transmit the weight value (numerical value only) directly to application software such as Microsoft Excel, Word, memo pad, and so on.
- A special USB software driver is not necessary.
- The EJ-02 cannot be used for bidirectional communication.

EJ-02 Installation

1. Turn off the balance and disconnect the AC adapter if used.
2. Remove the cover of the option slot on the rear by pressing and lowering it down.
3. Connect the connector in the slot to the EJ-02 unit and insert it into the slot.
4. Secure the EJ-02 with the screws supplied with the option.



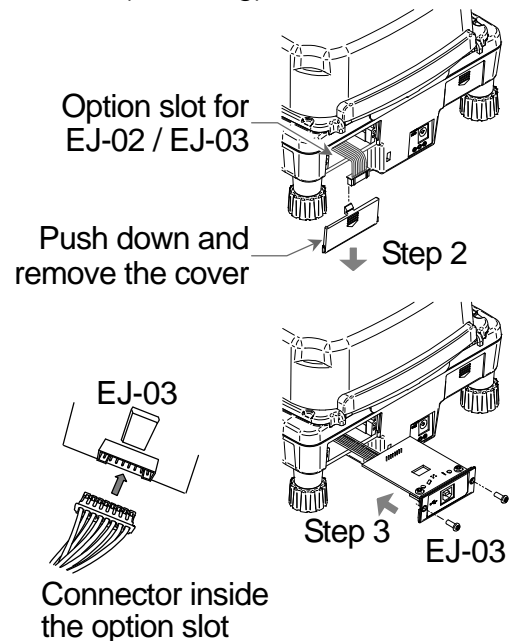
9.2. EJ-03 RS-232C Serial Interface

The EJ-03 allows an EJ-123/EJ-303 balance to be connected with a printer or a personal computer with the RS-232C interface.

- The RS-232C serial interface has the following four modes.
 - Stream mode.....Outputs data continuously.
 - Key mode.....Outputs data by pressing the **PRINT** key.
 - Auto-print modeOutputs data which meets the conditions of auto-print.
 - Command mode.....Controls the balance using commands from a computer.
- Set the parameters of the data format (b^P5 and b^tP_r) and data output mode (P_r^t), as necessary.
- Use a D-Sub 9 pin cable (straight type) to connect with a computer.
Optional cable: AX-KO2466-200 D-Sub 9 pin / 9 pin cable (2 m long)

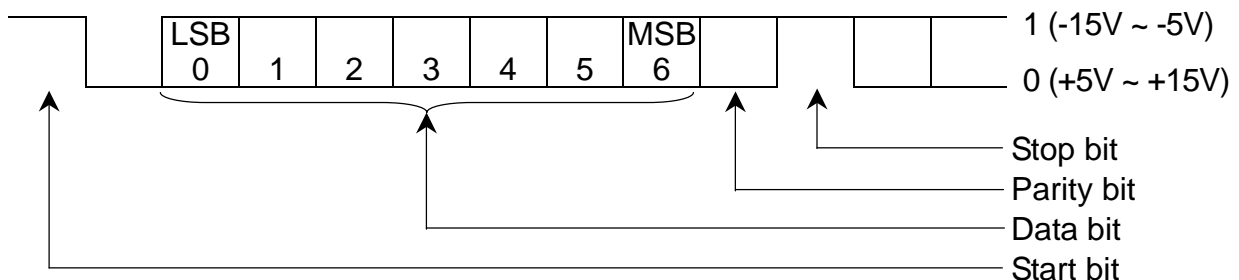
EJ-03 Installation

1. Turn off the balance and disconnect the AC adapter if used.
2. Remove the cover of the option slot on the rear by pressing and lowering it down.
3. Connect the connector in the slot to the EJ-03 unit and insert it into the slot.
4. Secure the EJ-03 with the screws supplied with the option.

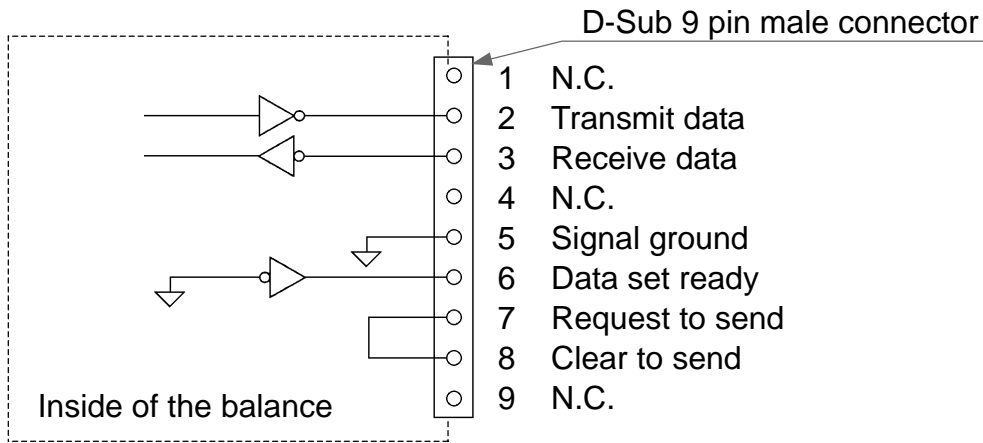


Interface Specifications

Transmission system	EIA RS-232C
Transmission form	Asynchronous, bi-directional, half-duplex
Data format	Baud rate: 1200, 2400, 4800, 9600 bps
	Data: 7 bits + parity 1bit (even or odd) or 8 bits (non-parity)
	Start bit: 1 bit
	Stop bit: 1 bit
	Code: ASCII
	Terminator: $C_R L_F$ (C_R : 0Dh, L_F : 0Ah)

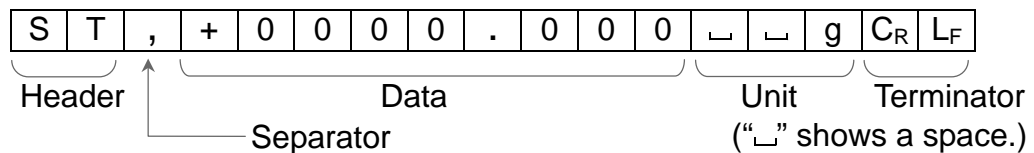


Pin Connections



The interface is designated as DCE (Data Communication Equipment).

9.3. Data Format



- There are four types of headers:
 - ST : Stable weighing data (including % data)
 - QT : Stable counting data
 - US : Unstable weighing data (including counting and % data)
 - OL : Out of weighing range (Over)
- The data is normally 9 digits including a decimal point and a sign.
- There are 10 types of units:
 - g : Weighing data “gram”
 - P C : Counting data “pcs”
 - % : Percentage data “%”
 - o z : Weighing data “decimal ounce”
 - o z t : Weighing data “troy ounce”
 - c t : Weighing data “carat”
 - d w t : Weighing data “penny weight”
 - GN : Weighing data “grain”
 - N : Force data “Newton”
 - D S : Calculated density (specific gravity) value
- The terminator is always C_RL_F.
- Example of output data:

Weighing data “gram”	S	T	,	+	0	0	1	2	.	3	4	5			g	C _R	L _F
Counting data	Q	T	,	+	0	0	0	1	2	3	4	5		P	C	C _R	L _F
Percentage data	S	T	,	+	0	0	0	1	2	3	.	4			%	C _R	L _F
Out of range “gram” (+)	O	L	,	+	9	9	9	9	.	9	9	9			g	C _R	L _F
Out of range “pcs” (-)	O	L	,	-	9	9	9	9	9	9	9	9		P	C	C _R	L _F

Data Output Mode

□ Stream mode

Set the function to "Prt 0".

The balance outputs the current display data. The data-update rate is approximately 10 times per second. This rate is the same as the display-update.

The balance does not output data while it is in the setting mode.

□ Key mode

Set the function to "Prt 1, 2 or 3".

When the **PRINT** key is pressed while the weight value is stable (the STABLE indicator is on), the balance transmits the data. When the data is transmitted, the display will blink one time.

□ Auto-print mode A

Set the function to "Prt 2".

The balance transmits the weight value when the display is stable (the STABLE indicator is on) and the data is greater than +4 digits.

The next output can be obtained after the display returns below +4 digits.

□ Auto-print mode B

Set the function to "Prt 3".

The balance transmits the weight value when the display is stable (the STABLE indicator is on) and the data is greater than +4 digits or less than -4 digits.

The next output can be obtained after the display returns between -4 digits and +4 digits.

Command Mode

In the command mode, the balance is controlled by commands that come from the personal computer and so on.

Command List

□ Command to request the current weighing data.

Command **Q** **C_R** **L_F**

Reply **S** **T** **,** **+** **0** **0** **1** **2** **.** **3** **4** **5** **┐** **┐** **g** **C_R** **L_F**

□ Command to zero or tare the balance (same as the **RE-ZERO** key).

Command **Z** **C_R** **L_F**

Reply **Z** **C_R** **L_F**

□ Command to change the weighing units (same as the **UNITS** key).

Command **U** **C_R** **L_F**

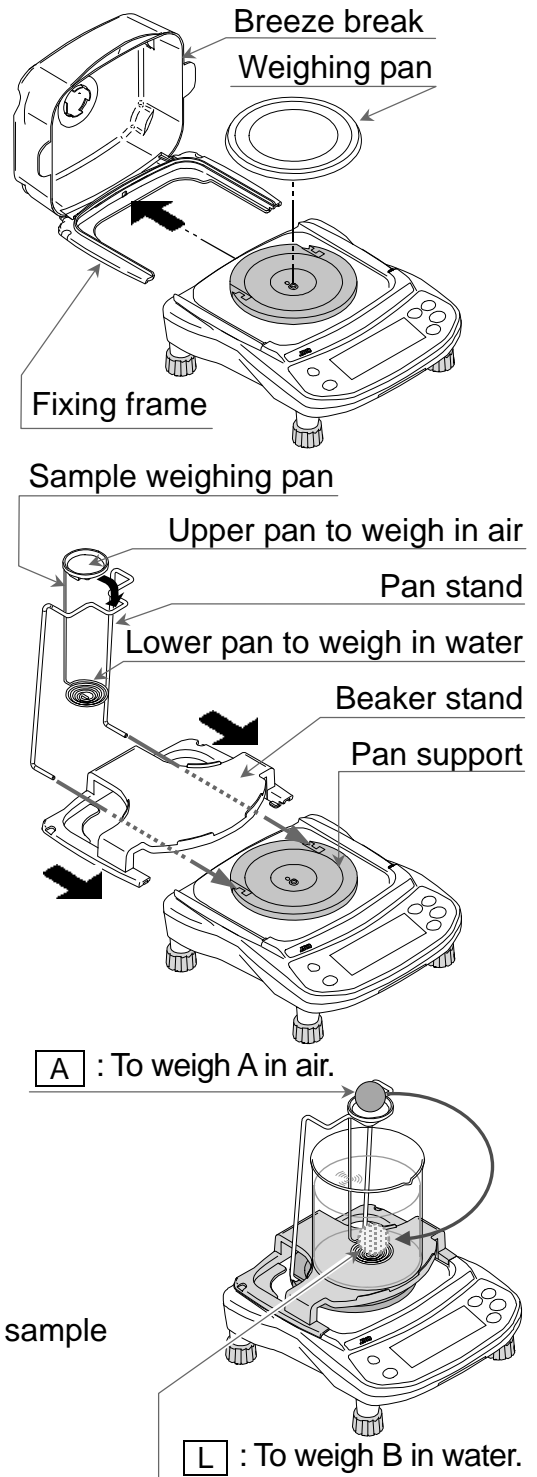
Reply **U** **C_R** **L_F**

9.4. EJ-13 Density Determination Kit

Using this option and calculation program, the balance can determine the density (specific gravity) of a sample.

EJ-13 Installation

- ❑ Remove the weighing pan and the fixing frame.
- ❑ Install the beaker stand on the balance and attach the pan stand to the pan support of the balance.
- ❑ Remove the breeze break that can not be used while using the density determination kit.
- ❑ Place a beaker filled with water on the beaker stand and place the sample weighing pan on top of the pan stand.



Density (Specific Gravity) Measurement

- ❑ The density for a liquid can be set two ways. One is to set the water temperature and the other is to set the density value directly.
- ❑ The factory setting for density of a liquid is 25 °C as water temperature (the density value, $\rho = 0.99704 \text{ (g/cm}^3\text{)}$, is used for calculation).
- ❑ The result is shown with three decimal places.
- ❑ The density (specific gravity) is calculated by the following formula.

$$S = \frac{A}{A - B} \times \rho$$

S: Density (specific gravity) of a sample
A: Weight in air
B: Weight in liquid
 ρ : Density of liquid (water)

Change the function table

Selecting a way to set the density of a liquid

Select the liquid density input method from the function table below.

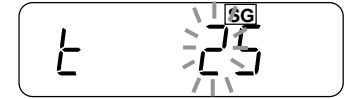
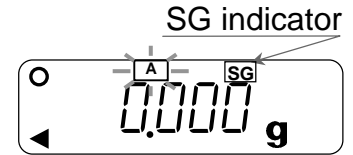
The function table is available only when the density measurement mode is selected.

Class	Item	Parameter	Description
Func	Ld in Liquid density input	◆ □	Water temperature
		!	Liquid density
			The way to input liquid density.

◆ : Factory setting

Entering the density of a liquid ($L d_{in} = 0$)

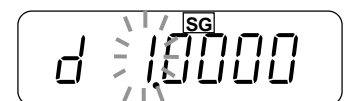
1. Press the **UNITS** key to select **SG**.
 2. Press and hold the **UNITS** key to display the liquid density input mode. The display will show the water temperature currently set (factory setting: 25 °C).
 3. Using the **RE-ZERO** (to increment the value) and **SAMPLE** keys (to shift the selected digit), set the value and press the **PRINT** key to store.
- To cancel the setting procedure and return to the density measuring mode, press the **UNITS** key. The input value is not stored.
 - The relation between the water temperature and density is shown below.



°C	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
0	0.99984	0.99990	0.99994	0.99996	0.99997	0.99996	0.99994	0.99990	0.99985	0.99978
10	0.99970	0.99961	0.99949	0.99938	0.99924	0.99910	0.99894	0.99877	0.99860	0.99841
20	0.99820	0.99799	0.99777	0.99754	0.99730	0.99704	0.99678	0.99651	0.99623	0.99594
30	0.99565	0.99534	0.99503	0.99470	0.99437	0.99403	0.99368	0.99333	0.99297	0.99259
40	0.99222	0.99183	0.99144	0.99104	0.99063	0.99021	0.98979	0.98936	0.98893	0.98849
50	0.98804	0.98758	0.98712	0.98665	0.98618	0.98570	0.98521	0.98471	0.98422	0.98371
60	0.98320	0.98268	0.98216	0.98163	0.98110	0.98055	0.98001	0.97946	0.97890	0.97834
70	0.97777	0.97720	0.97662	0.97603	0.97544	0.97485	0.97425	0.97364	0.97303	0.97242
80	0.97180	0.97117	0.97054	0.96991	0.96927	0.96862	0.96797	0.96731	0.96665	0.96600
90	0.96532	0.96465	0.96397	0.96328	0.96259	0.96190	0.96120	0.96050	0.95979	0.95906

Entering the density of a liquid directly ($L d_{in} = 1$)

1. Press the **UNITS** key to select **SG**.
 2. Press and hold the **UNITS** key to display the liquid density input mode. The display will show the liquid density currently set (factory setting: 1.0000 g/cm³).
 3. Using the **RE-ZERO** (to increment the value) and **SAMPLE** keys (to shift the selected digit), set the value and press the **PRINT** key to store.
- To cancel the setting procedure and return to the density measuring mode, press the **UNITS** key. The input value is not stored.

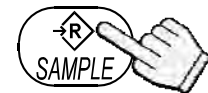
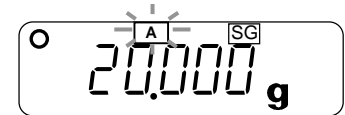
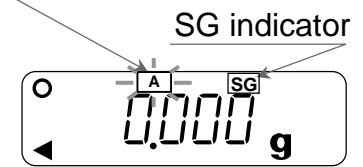


Example of density measurement

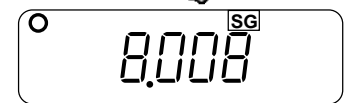
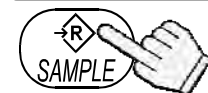
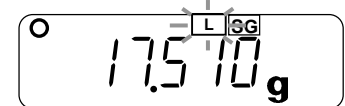
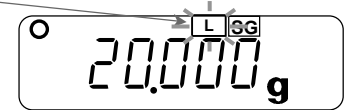
Selecting the density measurement mode

1. Press the **UNITS** key to select **SG** .
 - ❑ The weighing unit is “g”.
 - ❑ The display shows that **A** blinks and the balance is measuring the weight in air.
 - ❑ When the display does not show zero, press the **RE-ZERO** key to set the display to zero.
2. Place a sample on the upper pan.
3. Wait for the **STABLE** indicator to be displayed and press the **SAMPLE** key to store the weight in air.
4. The display shows that **L** blinks and the balance starts to measure the weight in water.
5. Place the sample on the lower pan in water.
 - ❑ Adjust the amount of water so that the sample is about 10 mm below the water surface.
6. Wait for the **STABLE** indicator to be displayed and press the **SAMPLE** key. Then the balance reads the weight in water and shows the density (specific gravity) of the sample.
7. To continue the density measurement, press the **SAMPLE** key again. To exit this measurement, press the **UNITS** key.

Measuring weight in air.



Measuring weight in water.



A : To weigh the sample in air.

L : To weigh the sample in water.

