EK-H SERIES

INSTRUCTION MANUAL

Compact Balances

EK-400H
EK-600H
EK-4000H
EK-6000H
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COMPLIANCE WITH FCC RULES
Please note that this equipment generates, uses and can radiate radio frequency energy. This equipment has been tested and has been found to comply with the limits of a Class A computing device pursuant to Subpart J of Part 15 of FCC rules. These rules are designed to provide reasonable protection against interference when equipment is operated in a commercial environment. If this unit is operated in a residential area it might cause some interference and under these circumstances the user would be required to take, at his own expense, whatever measures are necessary to eliminate the interference.

(FCC = Federal Communications Commission in the U.S.A.)

Note
Under some ambient electromagnetic conditions, this equipment may be affected by the electromagnetic interference.

This is hazard alert mark.
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1. INTRODUCTION

This manual describes how this balance works and how to get the most out of it in terms of performance.
The EK-H series includes the EK-400H, EK-600H, EK-4000H, and EK-6000H.

EK series balances have the following features:

- Comparator indicators to classify a weighing value
- Good Laboratory Practices (GLP) data output using a serial interface.
- With the optional NiCd battery pack (OP-09H), the balance can be used for cordless operation. (Be sure to charge the battery pack before using it for the first time.)
- A hold function to display the average reading, enabling measuring items difficult to read the weight value such as an animal that is moving.

2. UNPACKING

When unpacking, check whether all the following items are included:

![Diagram of balance components: Weighing pan, Main unit, AC adapter, Instruction manual]

⚠️ Please confirm that the AC adapter type is correct for your local voltage and receptacle type.
3. PART NAMES AND FUNCTIONS

Hold indicator
Illuminates when the weight value is held.

Comparator indicators

Stable indicator
Processing indicator
Standby indicator

Weight value
Weighing pan

Main unit
Display

[ON/OFF] key
[SAMPLE] key
[PRINT] key

[MODE] key

OP-07H
Underhook installation port
ZERO] key

Leveling foot

OP-09H
NiCd battery pack compartment

Bottom

AC adapter jack

OP-03H/04H/05H installation area

ON/OFF
1/0
Turns on or off the display.

PRINT
Outputs the weight value to a printer.

SAMPLE
Held down to enter the function setting mode.

MODE
Switches the weighing unit (the weighing mode).

ZERO
Clears the display to zero.
4. SETTING UP

4-1. Setting up your balance

1. Place the weighing pan on the main unit as shown on the previous page.
2. Adjust the level of the balance using the leveling feet. Use the spirit level to confirm.
3. Calibrate the balance before use.
   (Refer to "6. Calibration")

Balance location

To measure correctly, to keep the balance in good conditions, and to prevent hazards, observe the followings:

- Do not install the balance in locations that are subject to dust, breeze, vibration, great temperature fluctuations, condensation or that may have a magnetic field.
- Do not install the balance on a surface that is soft or that may cause the balance level to shift.
- Do not install the balance in direct sunlight.
- Do not install the balance near heaters or air conditioners.
- Do not use an unstable AC power source.

⚠️ Do not install the balance in a place where combustible or corrosive gases may exist.

4-2. Power source

For the power source, the AC adapter or the NiCd battery pack (OP-09H: Option, sold separately) is available.

When using the AC adapter

Use a stable power source. To use the AC adapter, insert the AC adapter plug into the AC adapter jack on the EK-H.

When using the NiCd battery pack

Insert the NiCd battery pack into the EK-H battery pack compartment. The balance can be used continuously for 8 hours using the battery pack. (With other options installed, the time will be approximately 6 hours. The time may vary with the method of use.) For details on using the battery pack, refer to the options manual.

If "Lb" is displayed when using the battery pack, immediately stop using it, and recharge the battery pack or use the AC adapter.
5. OPERATION

5-1. Turning the power ON and OFF

Using the AC adapter, connect the balance to the power source. The power ON test display appears for a few seconds. Then the display will disappear and the balance will be in "standby" state. Even if nothing is displayed, the power is connected. Warm up for a few minutes. Place nothing on the pan at this stage.

![Standby indicator]

5-2. Turning the display ON and OFF

1. Press the [ON/OFF] key to turn the display ON.

![Display symbols]

All the display symbols illuminate as shown above.
(About units: Only the units available illuminate.)

Note:
Pressing the [ON/OFF] key in the display ON condition will clear all the display symbols (standby mode, if the power is still connected).
5-3. Units

The most common unit of weight used around the world is grams, but there is often a need to shift to an alternative unit specific to the country where the balance is used or to select modes such as counting or percent. The units and the order they appear in the display are as follows:

Among the units, those available for the user have been set at the factory before shipping. The unit can be selected in the function setting mode. The order the units available appear is the same as above, while skipping the units that are not available.

Note It is possible to store only the units that will be actually used from the units available. For details, refer to "8-4. Storing a weighing unit".

Conversion table

<table>
<thead>
<tr>
<th>Abbrev.</th>
<th>Name</th>
<th>Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>oz</td>
<td>Ounce (Avoir)</td>
<td>28.349523125 g</td>
</tr>
<tr>
<td>lb</td>
<td>Pound(UK)</td>
<td>453.59237 g</td>
</tr>
<tr>
<td>lb/oz</td>
<td>Pound Ounce</td>
<td>28.349523125 g (16 oz = 1 lb)</td>
</tr>
<tr>
<td>ozt</td>
<td>Troy Ounce</td>
<td>31.1034768 g</td>
</tr>
<tr>
<td>ct</td>
<td>Metric Carat</td>
<td>0.2 g</td>
</tr>
<tr>
<td>mom</td>
<td>momme</td>
<td>3.75 g</td>
</tr>
<tr>
<td>dwt</td>
<td>Pennyweight</td>
<td>1.55517384 g</td>
</tr>
<tr>
<td>GN</td>
<td>Grain (UK)</td>
<td>0.06479891 g</td>
</tr>
<tr>
<td>TL</td>
<td>Tael (HK general, Sing.)</td>
<td>37.7994 g</td>
</tr>
<tr>
<td>TL</td>
<td>Tael (HK, jewelry)</td>
<td>37.429 g</td>
</tr>
<tr>
<td>TL</td>
<td>Tael (Taiwan)</td>
<td>37.5 g</td>
</tr>
<tr>
<td>TL</td>
<td>Tael (China)</td>
<td>31.25 g</td>
</tr>
<tr>
<td>t</td>
<td>Tola (India)</td>
<td>11.6638038 g</td>
</tr>
<tr>
<td>mes</td>
<td>Messghal</td>
<td>4.6875 g</td>
</tr>
</tbody>
</table>
5-4. Selecting a weighing unit

Select a unit as follows:

1. Press the MODE key several times to select a unit.

The following sections describe three common units: g (weight displaying mode=gram mode), PCS (counting mode), and % (percent mode).

5-5. Basic operation

1. Select a weighing unit.
   (Refer to "5-4. Selecting a weighing unit").

2. Place a "tare" on the weighing pan, and press the ZERO key. The balance displays \[ \text{tare g}. \]
   Tare: A container placed on the pan to hold an object, but not to be included in the weight.

3. Place the object to be weighed in the container.
   Wait for the stable indicator \( \text{on} \) to be displayed and read the value.

4. Remove the object from the pan.

With g mode:

Press the SAMPLE key to make the least digit blank.

Precautions during operation

- Make sure that the stable indicator is on whenever reading or storing a value.
- Do not press keys with a sharp instrument such as a pencil.
- Do not apply a shock or a load on the pan that is beyond the weighing range.
- Keep the balance interior free from foreign objects such as dust or liquid.
- Calibrate the balance periodically to keep weighing accuracy. (Refer to "6. Calibration").
5-6. Counting mode (PCS)

Determines the number of objects in a sample. Calculates the reading using the basic sample unit weight to determine how many pieces are contained.

Selecting the counting mode

1. Press the [MODE] key to select [PCS].

Storing the sample unit weight

2. Press the [SAMPLE] key to enter the sample unit weight storing mode.

3. To select the number of samples, press the [SAMPLE] key. It may be set to 10, 25, 50 or 100.

4. Place a tare container on the weighing pan, and press the [ZERO] key. The number specified in step 3 appears.

5. Place the number of samples specified on the pan. In this example, 25 pieces.

6. Press the [PRINT] key to calculate and store the unit weight. Remove the sample. The balance is set to count objects with this unit weight.

Counting the objects

7. Place the objects to be counted on the pan.

Counting mode using the ACAI function

ACAI™ (Automatic Counting Accuracy Improvement) is a function that improves the accuracy of the unit weight by increasing the number of samples as the counting process proceeds.

8. If a few more samples are added, the ACAI indicator illuminates. (To prevent an error, add three or more. The ACAI indicator will not illuminate if overloaded.)
9. The balance re-calculates the unit weight while the ACAI indicator is blinking. Do not touch the balance or samples on the pan until the ACAI indicator turns off.

10. Counting accuracy is improved when the ACAI indicator turns off. Each time the above operation is performed, a more accurate unit weight will be obtained. There is no definite upper limit of ACAI range for the number of samples exceeding 100. Try to add the same number of samples as displayed.

5-7. Percent mode (%)

Displays the weighing value in percentage compared to the reference (100%) weight. An allowable range of a certain percentage can be set for comparison.

Selecting the percent mode

1. Press the MODE key to select %. ( % : percent)

Storing the reference (100%) weight

2. Press the SAMPLE key to enter the reference weight storing mode.

3. Press the ZERO key to display 100.0 %.

4. Place the sample to be set as the reference weight on the pan.

5. Press the PRINT key to store the reference weight. Remove the sample.

Reading the percentage

6. Place the object to be compared to the reference weight on the pan. The displayed percentage is based on 100% of the reference weight.

Note: The number of decimal places varies with the reference weight.
5-8. Hold function

Use the hold function to weigh small living animals. The balance is allowed to stabilize for a fixed period of time, then the Hold indicator (Hold) comes on and the average sample weight of the moving object is displayed.

**Note:** Select 1 for the function setting, \( b \). 
Set the weighing unit to one other than the counting mode.

**Hold function Conditions:**

After setting the display to zero, the hold function is only activated if the display changes by at least the amounts shown in the following table. If the weight is less than the amount given below, the balance will remain in the normal weighing mode.

<table>
<thead>
<tr>
<th>Initial Range</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50 g</td>
<td>EK-600H, EK-400H</td>
</tr>
<tr>
<td>5.0 g</td>
<td>EK-6000H, EK-4000H</td>
</tr>
</tbody>
</table>

**Hold function Averaging Time:**

This function corresponds to the function \( b \), in the following way:

\( b \) Environment, Display

<table>
<thead>
<tr>
<th>( Cond ) Response / Environment</th>
<th>Averaging Time</th>
<th>Better weighing conditions faster weighing response</th>
<th>Worse weighing conditions slower weighing response</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2 sec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td>4 sec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8 sec</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* factory setting

**Hold function Stabilization range:**

This function corresponds to the internal setting \( b \), in the following way:

\( b \) Environment, Display

<table>
<thead>
<tr>
<th>( St - b ) Stability band width</th>
<th>This indicator is displayed when the weighing data is averaged within the range set below.</th>
<th>To measure most precisely, but slow to stabilize</th>
<th>To eliminate vibration and to stabilize quickly</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Stable when within ( \pm 6.25 % ) of the weighing value.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*1</td>
<td>Stable when within ( \pm 12.5 % ) of the weighing value.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Stable when within ( \pm 25 % ) of the weighing value.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* factory setting
Hold function-Example of use

1. Select 1 for the function setting, \( b \) \( \bar{R}_F \) \( n_C \), \( \text{Hold} \). (model EK-600H illustrated)
   Set the weighing unit to one other than the counting mode.

2. Place a tare container on the pan and press \([\text{ZERO}]\). The display will show zero.

3. Place the animal in the tare container.

4. When the hold mark is lit, read the displayed weight.

5. Remove the animal. The display will return to zero.
6. CALIBRATION

This function adjusts the balance for accurate weighing. Perform a calibration in the following case.

- When the balance is first used
- When the balance has been moved
- When the ambient environment has changed
- For periodic calibration

6-1. Calibration using a weight

1. Warm up the balance for at least half an hour with nothing on the pan.

2. Press and hold the SAMPLE and PRINT keys until [CAL out] appears, and release the keys.

3. The balance displays [CAL 0].

   To change the calibration weight value, proceed to step 4.

   To use the calibration weight value in the balance memory, proceed to step 5.

4. Press the SAMPLE key. Use the following keys to change the value. Available weight values for each model are listed in Table 1. The fine value of weight setting range is ±10 digits.

   **ZERO** key: To set the value of the digit selected.
   All digits blinking = Select a weight
   Two least digits blinking = Set the fine value of weight (−10 digit comes after +10 digit.)

   **SAMPLE** key: To select the digit to change.

   **PRINT** key: To store the weight value and return to step 3.

   **MODE** key: To cancel the operation and return to step 3.

![Press and hold](image)

![Release the keys](image)

![Set using the relevant keys](image)

### Table 1

<table>
<thead>
<tr>
<th>Model</th>
<th>EK-400H</th>
<th>EK-600H</th>
<th>EK-4000H</th>
<th>EK-6000H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration weight</td>
<td>200g</td>
<td>300g</td>
<td>2000g</td>
<td>3000g</td>
</tr>
<tr>
<td>* Factory setting</td>
<td>300g</td>
<td>400g</td>
<td>3000g</td>
<td>4000g</td>
</tr>
<tr>
<td></td>
<td>400g</td>
<td>500g</td>
<td>4000g</td>
<td>5000g</td>
</tr>
<tr>
<td></td>
<td>600g</td>
<td>6000g</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. At step 3, pressing the [PRINT] key weighs the zero-point value. Do not touch the pan during weighing.

6. Place the calibration weight with the same value as displayed on the pan. Press the [PRINT] key to weigh it. Do not touch the balance during weighing.

7. [End] appears. Remove the weight from the pan.

8. The balance returns to the weighing mode.

Note: Whether or not to use this mode can be selected in "to permit or prohibit key operation". Refer to Page 20.
7. SETTING RESPONSE CONDITION

Changes the response of the balance according to the ambient environment (breeze and vibration).

1. Press and hold the **SAMPLE** key. The balance displays **bASfnc** and enters the function setting mode.

2. Press the **PRINT** key to display **Cond**.

3. Press the **ZERO** key several times to select a parameter. (Refer to the function list on page 17.)

4. Press the **PRINT** key to store the new response parameter. **CP fnc** appears after **End**.

5. Press the **MODE** key to return to the weighing mode.

Response condition parameters

- **Cond 0**: Quick weighing, sensitive value
- **Cond 1**: 
- **Cond 2**: Slow weighing, stable value
8. FUNCTIONS

Note: Whether or not to use this mode can be selected in "permit or prohibit key operation". Refer to page 20.

8-1. Key operation

- Cancels the operation and turns off the display.
- Item key
  Selects a class and an item.
  In the weighing mode, press and hold the key to enter the function setting mode.
- Enter key
  Proceeds to the selected class.
  Stores the settings per class and goes to the next class.
- Parameter key
  Selects a parameter.
- Cancel key
  Cancels the operation and closes the mode.

8-2. Entering the function setting mode.

In the weighing mode, press and hold the SAMPLE key to enter the function setting mode and display $BAS\text{Fnc}$. Each time the SAMPLE key is pressed, the class appears one after another.

Once the class is selected, the set items are available for selection. (Refer to "Function list".)

Press and hold Function setting mode

$BAS\text{Fnc}$

Each pressing switches the class

$CP\text{ Fnc}$

Set using the relevant keys
8-3. Setting example

To set the response of the balance to "Slow weighing, stable value" and the display refresh rate to "10 times/second".

1. Press and hold the SAMPLE key to display \(bASfnc\).

2. Press the PRINT key. The balance displays \(Cond\).

3. Press the ZERO key several times to display \(Cond\) 2.

4. Press the SAMPLE key several times to select \(Spd\).

5. Press the ZERO key several times to select \(Spd\) 1.

6. Press the PRINT key to store the parameters. \(CP Fnc\) appears after \(End\).

7. Press the MODE key to return to the weighing mode.

Press and hold  
\(bASfnc\)  
Each pressing switches the parameter  
To confirm  
To store  
Returns to the weighing mode
8-4. Storing a weighing unit

It is possible to store only the units that will be actually used from the units available. For the units available, refer to "5-3.Units".

Store the selected unit as described below:

1. Press and hold the SAMPLE key to display \textit{bASFnc}.

2. Press the SAMPLE key to display \textit{Unit}.

3. Press the PRINT key.

4. Press the SAMPLE key several times to select a weighing unit.

5. Press the ZERO key to store the weighing unit.

6. Press the PRINT key. \textit{End} appears after \textit{End}.

7. Press the MODE key to exit the function setting mode. The balance returns to the weighing mode with the selected unit.
# 8-5. Function list

<table>
<thead>
<tr>
<th>Class</th>
<th>Item</th>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>bASfnc</strong></td>
<td>Environment</td>
<td><strong>Hold</strong></td>
<td>The display is held.</td>
</tr>
<tr>
<td><strong>Display</strong></td>
<td><strong>Response</strong></td>
<td>Hold function</td>
<td>The display is held.</td>
</tr>
<tr>
<td><strong>St-b</strong></td>
<td>Stability band width</td>
<td>0</td>
<td>Stable when within ±1 digit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Stable when within ±3 digits</td>
</tr>
<tr>
<td><strong>Err</strong></td>
<td>Zero tracking</td>
<td>0</td>
<td>The function to keep zero display by tracking zero-drift</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td><strong>Spd</strong></td>
<td>Display refresh rate</td>
<td>0</td>
<td>6 times/second</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>10 times/second</td>
</tr>
<tr>
<td><strong>Pnt</strong></td>
<td>Decimal point</td>
<td>0</td>
<td>Point (.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Comma (,)</td>
</tr>
<tr>
<td><strong>P-on</strong></td>
<td>Auto display-ON</td>
<td>0</td>
<td>The display turns on automatically when AC adapter is connected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>ON</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class</th>
<th>Item</th>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CP Fnc</strong></td>
<td>Comparator</td>
<td><strong>CP</strong></td>
<td>No comparison</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Comparator mode</td>
<td>Comparison, not near zero, when stable value or over</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Comparison, near zero, when stable value or over</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Continuous comparison, not near zero</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Continuous comparison, near zero</td>
</tr>
<tr>
<td></td>
<td><strong>CPin</strong></td>
<td>Input method</td>
<td>Digital input, upper/lower limits</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weighing input, upper/lower limits</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Digital input, reference value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weighing input, reference value</td>
</tr>
<tr>
<td><strong>bEP-</strong></td>
<td>LO buzzer</td>
<td>0</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td><strong>bEP-</strong></td>
<td>OK buzzer</td>
<td>0</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td><strong>bEP</strong></td>
<td>HI buzzer</td>
<td>0</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>ON</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Class</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CP H</strong></td>
<td>Upper limit</td>
<td>Displayed when upper/lower limit is selected.</td>
</tr>
<tr>
<td><strong>CP Lo</strong></td>
<td>Lower limit</td>
<td>Displayed when upper/lower limit is selected.</td>
</tr>
<tr>
<td><strong>CP Ref</strong></td>
<td>Reference value</td>
<td>Displayed when reference value is selected.</td>
</tr>
<tr>
<td><strong>CP Toler</strong></td>
<td>Tolerance</td>
<td>Displayed when upper/lower limit is selected.</td>
</tr>
</tbody>
</table>

*Factory setting

*1 "Digit" is the minimum display unit.
<table>
<thead>
<tr>
<th>Class</th>
<th>Item</th>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dout</td>
<td>Prt</td>
<td>0</td>
<td>Key mode. PRINT key is accepted only when display is stable.</td>
</tr>
<tr>
<td></td>
<td>Data output mode</td>
<td>1</td>
<td>Auto print mode A (Reference=zero) Data is output when display is stable and conditions of R_p - P, R_p - B and reference value are met.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Auto print mode B (Reference=last stable value)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Stream mode. Data is output continuously.</td>
</tr>
<tr>
<td></td>
<td>P - P</td>
<td>0</td>
<td>Plus only. Displayed value&gt;Reference</td>
</tr>
<tr>
<td></td>
<td>Auto print polarity</td>
<td>1</td>
<td>Minus only. Displayed value&lt;Reference</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Both polarities. Regardless of displayed value.</td>
</tr>
<tr>
<td></td>
<td>P - b</td>
<td>0</td>
<td>10 digits. Difference between reference value and displayed value</td>
</tr>
<tr>
<td></td>
<td>Auto print difference</td>
<td>1</td>
<td>100 digits.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>1000 digits.</td>
</tr>
<tr>
<td></td>
<td>Puse</td>
<td>0</td>
<td>No pause. Selects output interval.</td>
</tr>
<tr>
<td></td>
<td>Data output pause</td>
<td>1</td>
<td>Pause (1.5 seconds)</td>
</tr>
<tr>
<td></td>
<td>Rk - F</td>
<td>0</td>
<td>Not used. Whether or not to feed paper automatically after data output</td>
</tr>
<tr>
<td></td>
<td>Auto feed</td>
<td>1</td>
<td>Used</td>
</tr>
<tr>
<td></td>
<td>Infa</td>
<td>0</td>
<td>No output. Selects the GLP data output format.</td>
</tr>
<tr>
<td></td>
<td>GLP output</td>
<td>1</td>
<td>AD-8121 format</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Data format</td>
</tr>
<tr>
<td></td>
<td>Rd - d</td>
<td>0</td>
<td>Not displayed.</td>
</tr>
<tr>
<td></td>
<td>Zero after output</td>
<td>1</td>
<td>Displayed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>nephew</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Baud rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>600 bps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>1200 bps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>2400 bps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>4800 bps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>9600 bps</td>
</tr>
<tr>
<td></td>
<td>Bep</td>
<td>0</td>
<td>7 bits, EVEN.</td>
</tr>
<tr>
<td></td>
<td>Length, parity bits</td>
<td>1</td>
<td>7 bits, ODD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>8 bits, NON</td>
</tr>
<tr>
<td></td>
<td>Crlf</td>
<td>0</td>
<td>CR, LF. CR:ASCII 0Dh</td>
</tr>
<tr>
<td></td>
<td>Terminator</td>
<td>1</td>
<td>CR</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>0</td>
<td>A&amp;D format</td>
</tr>
<tr>
<td></td>
<td>Data format</td>
<td>1</td>
<td>DP format</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>KF format</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>MT format</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>NU format</td>
</tr>
<tr>
<td></td>
<td>E - up</td>
<td>0</td>
<td>No limit. Selects the maximum wait time to receive command.</td>
</tr>
<tr>
<td></td>
<td>Time up</td>
<td>1</td>
<td>For one second</td>
</tr>
<tr>
<td></td>
<td>Ercd</td>
<td>0</td>
<td>No output. AK:ASCII 06h</td>
</tr>
<tr>
<td></td>
<td>AK, error code</td>
<td>1</td>
<td>Output</td>
</tr>
<tr>
<td></td>
<td>Cts</td>
<td>0</td>
<td>Not used. Controls CTS and RTS. Set to 0 whenever printer is connected.</td>
</tr>
<tr>
<td></td>
<td>CTS control</td>
<td>1</td>
<td>Used</td>
</tr>
</tbody>
</table>

* Factory setting
8-6. Initial settings

The instrument parameters shown below can be restored to the factory settings using the following procedure.

Parameters to be restored:
Function setting, calibration weight value, PCS, %, permit or prohibit key operation

1. Press the ON/OFF key to display \( \text{I/O} \).
   (Standby indicator)

2. While pressing and holding both the SAMPLE and PRINT keys, press the ON/OFF key.
   The balance displays \( PS \).

3. Press the SAMPLE key to display \( Clr \).

4. Press the PRINT key to display \( Clr \ no \).

5. Press the ZERO key to display \( Clr \ Ga \).
   (Factory setting)

6. Press the PRINT key to restore the parameters to the factory settings. The balance displays \( End \).

7. The balance returns to the weighing mode.

Returns to the weighing mode.
8-7. To permit or prohibit key operation

Sets whether or not to permit changing the parameters stored in the balance memory.

1. Press the **ON/OFF** key to display  
   (Standby indicator)

2. While pressing and holding both the **SAMPLE** and **PRINT** key, press the **ON/OFF** key.
   The balance displays **PS**.

3. Press the **PRINT** key to display **R-0011**.

4. Make a change with the following keys.
   - **ZERO** key  To change the condition of the digit selected.
   - **SAMPLE** key  To select the digit to change.
   - **PRINT** key  To store the new settings (**End** appears after storage.)
       and proceed to the next step.
   - **MODE** key  To cancel the operation.
       Press the key twice to proceed to the next step.

5. The balance will return to the weighing mode.
9. COMPARATOR

The results of the comparison are indicated by [HI] [OK] [LO] on the display.

Operating conditions: No comparison (comparison turned off)
- Comparison at stable value or over, not near zero
- Comparison at stable value or over, near zero
- Continuous comparison, not near zero
- Continuous comparison, near zero

To compare, use:
- Upper limit value and lower limit value
- Reference value plus and minus a tolerance value

Input methods: Digital input, Weighing input

Refer to the function list about the meaning of \( f_{\text{P Func}} \).
Whenever the weighing unit is changed, re-enter the comparator value.

9-1. Setting example 1

This example will use:
- "Continuous comparison, not near zero",
- "Reference value and a tolerance value"
and "Digital input".

Selecting a comparison method

1. Press and hold the [SAMPLE] key to display \( b_{\text{AS Fnc}} \).
2. Press the [SAMPLE] key several times to display \( f_{\text{P Func}} \).
3. Press the [PRINT] key.
4. Press the [ZERO] key several times to display \( f_{\text{P 3}} \).
5. Press the [SAMPLE] key to display \( f_{\text{P in}} \).
6. Press the [ZERO] key several times to display \( f_{\text{P in 2}} \).
7. Press the **PRINT** key to store the settings.

**Entering the reference and tolerance values**

8. With **CP ref** displayed, press the **PRINT** key. All the digits blink. Press the **ZERO** key. Enter the reference value with the following keys.
   - **SAMPLE** key: To select the digit to change.
   - **ZERO** key: To set the value of the digit selected. Hold down the key to switch the polarity.
   - **PRINT** key: To store the value and proceed to the next step.
   - **MODE** key: To cancel the value and proceed to the next step.

9. With **CP lin** displayed, press the **PRINT** key. Enter the tolerance value in percentage to the reference value as 100%, using the following keys.
   - **SAMPLE** key: To select the digit to change.
   - **ZERO** key: To set the value of the digit selected.
   - **PRINT** key: To store the value and proceed to the next step.
   - **MODE** key: To cancel the value and proceed to the next step.

10. Press the **PRINT** key. **dout** appears after **End**.

11. Press the **MODE** key to return to the weighing mode.
9-2. Setting example 2

This example will use "Continuous comparison, near zero", "Upper limit / lower limit" and "Digital input".

Selecting a comparison method

1. Press and hold the SAMPLE key to display \( bA5Fnc \). (See Example 1 for the detail about steps 1-7.)

2. Press the SAMPLE key to display \( \text{LCP F nc} \).

3. Press the PRINT key to display \( LCP \).

4. Press the ZERO key several times to display \( LCP \). \text{Q}.

5. Press the SAMPLE key several times to display \( LCP \). \text{IN}.

6. Press the ZERO key several times to display \( LCP \). \text{IN} \text{D}.

7. Press the PRINT key to store the selection.

Entering the upper and lower limit values

8. With \( LCP \). \text{H} \text{L} \) displayed, press the PRINT key. All the digits blink. Press the ZERO key. Enter the upper limit value using the following keys.

- SAMPLE key: To select the digit to change.
- ZERO key: To set the value of the digit selected. Hold down the key to switch the polarity.
- PRINT key: To store the value and proceed to the next step.
- MODE key: To cancel the value and proceed to the next step.
9. With \( P \ L_o \) displayed, press the PRINT key. All the digits blink. Press the ZERO key. Enter the lower limit value using the following keys.

- **SAMPLE** key: To select the digit to change.
- **ZERO** key: To set the value of the digit selected.
- **PRINT** key: To store the value and proceed to the next step.
- **MODE** key: To cancel the value and proceed to the next step.

10. Press the PRINT key. \( d_{out} \) appears after \( End \).

11. Press the MODE key to return to the weighing mode.

9-3. Setting example 3

This example will use "Comparison at stable value or over, near zero", "Upper limit / lower limit" and "Weighing input".

**Selecting a comparison method** (See example 1)

1. Press and hold the SAMPLE key to display \( b_{R5Fnc} \). (See Example 1 for the detail about steps 1-7.)
2. Press the SAMPLE key to display \( P_{Fnc} \).
3. Press the PRINT key to display \( P \).
4. Press the ZERO key several times to display \( P \ Z \).
5. Press the SAMPLE key several times to display \( P \ in \).
6. Press the ZERO key several times to display \( P \ in \).
7. Press the PRINT key to store the selection.
Entering the upper and lower limit values

8. With \( \text{CPH} \) displayed, press the PRINT key. All the digits blink. Press the ZERO key. The weighed value is displayed.

9. Place a sample whose weight corresponds to the upper limit value on the pan. Press the PRINT key to store the weight. Remove the sample. Press the ZERO key to display zero.

10. \( \text{CP Lo} \) appears after the above operation has completed.

11. With \( \text{CP Lo} \) displayed, press the PRINT key. All the digits blink. Press the ZERO key. The weighed value is displayed.

12. Place a sample whose weight corresponds to the lower limit value on the pan. Press the PRINT key to store the weight. Remove the sample. Press the ZERO key to display zero.

13. Press the PRINT key. \( \text{dout} \) appears after \( \text{End} \).

14. Press the MODE key to return to the weighing mode.
The ID number is used to identify the balance when Good Laboratory Practice (GLP) is used. The following GLP data is transmitted to an AD-8121 printer or a computer using option OP-03H or OP-05H.

- The result of calibration  • The result of calibration test

Note: Option OP-03H or OP-05H is needed to achieve this data output. The data format conforms to $r_n^F_n$ of the function list. Refer to the options manual.

10-1. Setting the ID number

1. Press and hold the [SAMPLE] key to display $bASFnc$.

2. Press the [SAMPLE] key several times to display $id$.

3. Press the [PRINT] key. Enter the ID number using the following keys.

   - [ZERO] key To set the character of the digit selected. Refer to the table below for the "display character set".
   - [SAMPLE] key To select the digit to change.
   - [PRINT] key To store the value and proceed to the next step.
   - [MODE] key To cancel the value and proceed to the next step.

4. When the above operation has completed, $bASFnc$ appears after $End$.

5. Press the [MODE] key to return to the weighing mode.

Display character set

<table>
<thead>
<tr>
<th>0 1 2 3 4 5 6 7 8 9</th>
<th>_ _ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9</td>
<td>R r s g e f d h s j t k l i n o p q r s t u v w x y z</td>
</tr>
<tr>
<td></td>
<td>Space</td>
</tr>
</tbody>
</table>
10-2. Calibration test

Calibration test using a weight

The calibration test mode is used to confirm accurate weighing.

1. Press and hold the **SAMPLE** and **PRINT** keys. **LL out** appears after **ERR out**. Release the keys when **LL out** is displayed.

2. **LL 0** is displayed.

3. Press the **SAMPLE** key and change the weight value using the following keys.
   - **ZERO** key To set the value of the digit selected.
   - **SAMPLE** key To select the digit to change.
   - **PRINT** key To store the value and return to step 2.

4. At step 2, press the **PRINT** key. The zero point is weighed and is displayed for a few seconds.
5. Place a weight, with the same value as displayed, on the pan. Press the PRINT key to weigh it. The weighed value is displayed for a few seconds.

6. End appears. Remove the weight.

7. GLP is displayed and the data is output.

8. The balance will return to the weighing mode.
### 10-3. Output examples

#### Data format for calibration

**AD-8121 format**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>A &amp; D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>EK-600H</td>
</tr>
<tr>
<td>Serial number</td>
<td>1234567</td>
</tr>
<tr>
<td>ID</td>
<td>ABCDEF</td>
</tr>
<tr>
<td>Date</td>
<td>97/01/14</td>
</tr>
<tr>
<td>Time</td>
<td>02:53:21 PM</td>
</tr>
<tr>
<td>Calibration</td>
<td>CALIBRATED(EXT.)</td>
</tr>
<tr>
<td>Calibration weight value</td>
<td>+500.00 g</td>
</tr>
<tr>
<td>Signature</td>
<td>- - - - - -</td>
</tr>
</tbody>
</table>

**Data format**

- Manufacturer - A & D
- Model - EK-600H
- Serial number - 1234567
- ID - ABCDEF
- Date - 97/01/14
- Time - 02:53:21 PM
- Calibration - CALIBRATED(EXT.)
- Calibration weight value - +500.00 g
- Signature - - - - - -

#### Data format for calibration test

**AD-8121 format**

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>A &amp; D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>EK-600H</td>
</tr>
<tr>
<td>Serial number</td>
<td>1234567</td>
</tr>
<tr>
<td>ID</td>
<td>ABCDEF</td>
</tr>
<tr>
<td>Date</td>
<td>97/01/14</td>
</tr>
<tr>
<td>Time</td>
<td>03:15:40 PM</td>
</tr>
<tr>
<td>Calibration test</td>
<td>CALIBRATED(EXT.)</td>
</tr>
<tr>
<td>Zero point value</td>
<td>0.00 g</td>
</tr>
<tr>
<td>Target</td>
<td>+500.00 g</td>
</tr>
<tr>
<td>Signature</td>
<td>- - - - - -</td>
</tr>
</tbody>
</table>

**Data format**

- Manufacturer - A & D
- Model - EK-600H
- Serial number - 1234567
- ID - ABCDEF
- Date - 97/01/14
- Time - 03:15:40 PM
- Calibration test - CALIBRATED(EXT.)
- Zero point value - 0.00 g
- Target - +500.00 g
- Signature - - - - - -

---

Space, ASCII 20h
<TERM> Terminator, CR, LF, or CR
CR Carriage return, ASCII 0Dh
LF Line feed, ASCII 0Ah
11. OPTIONS

The following options are available to be purchased separately.

(1) OP-03H RS-232C serial interface
(2) OP-04H Comparator relay output
(3) OP-05H Printer interface (Current loop output)
(4) OP-07H Underhook
(5) OP-09H NiCd battery pack

Note: OP-03H, OP-04H, and OP-05H can not be used at the same time. Refer to the options manual for details.
The current loop interface is a passive type and requires an external power source that can supply 20mA. The external power source is not necessary when connecting an AD-8121.
12. MAINTENANCE

12-1. Notes on maintenance

☐ Do not disassemble the balance. Contact your local A&D dealer if your balance needs service or repair.
☐ Please use the original box for transportation.
☐ Do not use organic solvents to clean the balance. Use a warm lint free cloth dampened with a mild detergent.

12-2. Error codes

☐ Overload error

\[ E \]

Warning to indicate that an object beyond the balance capacity has been placed on the pan. Remove the object from the pan.

☐ Weighing pan error

\[ -E \]

Warning to indicate that the weighing value is too light. Confirm that the weighing pan is properly installed. Try to see if calibration will solve the problem.

☐ Unit weight error

\[ \text{Lo} \]

The sample weight is too light to set the unit weight in the counting mode.

☐ Sample quantity notice

\[ \begin{array}{c}
25. - \\
50. - \\
100. - 
\end{array} \]

When samples are light and the counting error could become large, the balance requests you to add the number of samples displayed to those already on the pan. Place them on the pan and press the PRINT key to store the correct value.

Note: Pressing the PRINT key without adding samples may reduce counting accuracy.

☐ CAL errors

\[ \text{CAL E} \]

Warning to indicate that calibration has been canceled because the calibration weight is too heavy. Confirm that nothing is on the pan. Press the MODE key to return to the weighing mode.

\[ -\text{CAL E} \]

Warning to indicate that calibration has been canceled because the calibration weight is too light. Confirm that the weighing pan is properly installed. Press the MODE key to return to the weighing mode.

☐ Stability error

\[ \text{Error 1} \]

Warning to indicate that the weight value is not stable and the balance can not display it. Prevent vibration and drafts. Press the MODE key to return to the weighing mode.

If you can not cancel the error or other errors occurred, request service from the store where you purchased the balance, or from the A&D dealer.
## 13. SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>EK-400H</th>
<th>EK-600H</th>
<th>EK-4000H</th>
<th>EK-6000H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighing capacity (g)</td>
<td>400</td>
<td>600</td>
<td>4000</td>
<td>6000</td>
</tr>
<tr>
<td>Minimum display (g)</td>
<td>0.01 / 0.1</td>
<td>0.1 / 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of samples (pcs.)</td>
<td></td>
<td></td>
<td>10, 25, 50, or 100</td>
<td></td>
</tr>
<tr>
<td>Maximum countable number (pcs.)</td>
<td>40000</td>
<td>60000</td>
<td>40000</td>
<td>60000</td>
</tr>
<tr>
<td>Minimum unit weight (g)</td>
<td>0.01</td>
<td></td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Minimum % display (%)</td>
<td>0.01 / 0.1 / 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum % weight (g)</td>
<td>1.00</td>
<td></td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Display</td>
<td>7-segment LCD (Character height =16 mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admissible ambient temperature</td>
<td>5-40°C (41-104°F)</td>
<td>Relative humidity 85% or less</td>
<td>No condensation</td>
<td></td>
</tr>
<tr>
<td>Repeatability (Standard deviation)</td>
<td>0.01 g</td>
<td>0.1 g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linearity</td>
<td>±0.02 g</td>
<td></td>
<td>±0.2 g</td>
<td></td>
</tr>
<tr>
<td>Sensitivity drift</td>
<td>±10 ppm / °C (10-30°C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display refresh rate (Approx.)</td>
<td>5 times/second</td>
<td>10 times/second for high speed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>AC adapter or NiCd battery (Option)</td>
<td>Confirm that the AC adapter is correct for the receptacle type and voltage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery operating hours</td>
<td>Approx. 8 hours (Approx.6 hours using with options)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighing pan size</td>
<td>133 mm × 170 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass (Approx.)</td>
<td>1.5 kg</td>
<td>1.6 kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calibration weight (g)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Factory setting</td>
<td>200</td>
<td>300</td>
<td>2000</td>
<td>3000</td>
</tr>
<tr>
<td></td>
<td>300</td>
<td>400</td>
<td>3000</td>
<td>4000</td>
</tr>
<tr>
<td></td>
<td>• 400</td>
<td>• 500</td>
<td>• 4000</td>
<td>• 5000</td>
</tr>
<tr>
<td></td>
<td>600</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
External dimensions

253 mm

200 mm

170 mm

73 mm