ELECTRONIC BALANCE

OPERATOR'S MANUAL

• HT-SA-2014-09

Contents

1. Precautions before using the balance

For safe and dependable operation of this balance, please comply with the following **safety precautions:**

● Verify that the input voltage printed on the AC Adapter and the plug type matches the local AC power supply.

● Make sure that the power cord does not pose a potential obstacle or tripping hazard.

● Disconnect the scale from the power supply when cleaning the scale.

● Do not operate the scale in hazardous or unstable environments.

● Do not immerse the scale in water or other liquids.

● Do not drop loads on the platform.

● Use only approved accessories and peripherals, as available.

● Operate the scale only under ambient conditions specified in these instructions.

● Service should be performed by authorized personnel only.

● It must not be bumped against by other items or overloaded with excessively heavy weights (The load must not exceed the maximum capacity of the balance).

● Give a warm-up for 30mins before using the scale.

2. Name and type of the instrument

The HT-NA model weighing balance is a self-indicating weighing scale of Class II with single weighing range, an external AC mains adapter, and an internal rechargeable battery.

The balance consists of analogue to digital conversion, microprocessor control, power supply, keyboard, and a weight display contained within a single enclosure.

## 3. The Display and Keypad

3.1 Construction

The balance is housed in a plastic enclosure. One display is placed on the front together with keyboard. It is intended to be used in shops as well as industrial environment.

A level indicator is fixed behind the enclosure and four adjustable leveling feet   are located at the bottom.

3.2 Display description

The LCD display is described below.
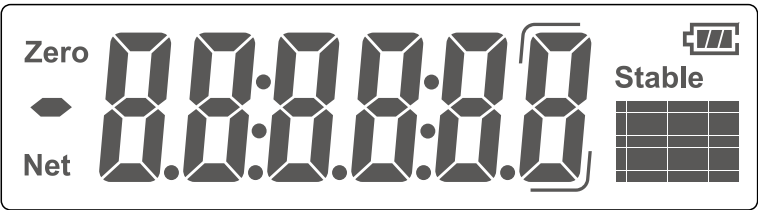
- When the Capacity of the balance is 600.0g, the last digit will be the auxiliary display digit (a symbol indicating the digit):

$$\boxed{\text{60000} \quad \text{Stable} \atop \text{g}}$$

- When the Capacity of the balance is 150.00g, 300.00, 1500.0 and 3000.0g, the last digit will be blank in normal weighing mode only if the **EXT.D** key is pressed to extend the display.

$$\boxed{\text{30000} \quad \text{g}}$$

3.3 Keypad function

ON/OFF: To power on or power off the balance.

MODE: To choose weighing, parts counting, percentage weighing or density function mode.

EXT.D/SAMPLE: To extend the display.

To take samples in parts counting mode or percentage weighing mode.

UNIT/▲: To select the available units. (7)

To increase value or page up

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TARE/▼: To subtract the container's weight

To decrease value or page down

ZERO/BACK: To return the display to "0"

To return to last step in setting

BL/►: To select the backlight type

To move the digit to right

PRINT/ENTER: To transmit or print the data

To confirm the current setting in setting mode

4. Functions and Operation

The balance can be available for operation from mains at 110~240V (50/60Hz) with an external AC/DC adapter with 12V output voltage and an optional internal 6V rechargeable battery.

4.1 Power-up

When power up the balance, the display will first show the software version (Ver. 1.00) for 2 seconds and then perform a self display test. Then it will show the Calibration counting times for about 1 second. After that it will automatically establish the current weight as a new zero reference point.

4.2 Weighing mode

4.2.1 Display range

The display can show weight from –Max (Tare weight) to Max+9e (Gross weight).

4.2.2 Zero-setting

Zero-setting range: ±2% of Max

Zero-setting is only available when the load receptor is not in motion (The display is stable).

Semi-automatic zero-setting

When there is a minor weight displayed (without load on the pan), press **ZERO** key to return to the display to zero, then the **Zero** symbol appears which indicates that the display now is at the zero point.

Zero-tracking

The instrument is equipped with a zero-tracking feature which operates at a speed of ±0.25e/s and only when the indicator is at gross zero and there is no motion in the weight display.

Initial zero-setting

Initial zero-setting range: ±10% of Max

When the initial zero-setting range is below -10% of Max, the display shows "-------" and the buzzer sounds. To return the display to normal mode, please adding more weights until the initial zero-setting range is between ±10% of Max.

When the initial zero-setting range is beyond +10% of Max, the display shows "-------" and the buzzer sounds. To return the display to normal mode, please take off weights until the initial zero-setting range is between ±10% of Max.

4.2.3 Tare function

Press **TARE** key to subtract the current displayed weight value as the tare weight value (Consecutive tare operations are permitted). The **NET** symbol appears and the display will show a net weight of the object to be weighted.

```
  ┌────────────────────────────────────┐
  │                        Stable      │
  │              ∩∩                     │
  │              UU            g        │
  │  Net                               │
  └────────────────────────────────────┘
```

Then take off the container, the display will show a minus "-" weight value which equals to the container's weight.

```
  ┌────────────────────────────────────┐
  │  Zero                  Stable      │
  │   ●          ⁹∩                    │
  │  Net                       g        │
  └────────────────────────────────────┘
```

■▶ **Eliminate the tare weight**

To eliminate the tare weight by pressing the **TARE** key with no object on the scale.

Note:

1. When performing the tare operation(s), make sure the instrument is in stable.

2. If consecutive tare operations have been performed, to clear the tare value, please remove all the containers on the pan first and then press **TARE** key.

3. Tare range is the full capacity of balance for all models.

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4.2.4 Units selection

Press the **UNIT** key to choose the weighing units and the display will be changed to the new value with the units shown. There are up to 13 units of weight that can be enabled. Refer to Parameter Set-up Section.

4.3 Counting mode

In normal weighing mode, press **MODE** key to enter into counting mode, and the display shows the sample size:

```
┌─────────────────────────────────┐
│ Zero                            │
│      ┌                Stable    │
│      └       I⌐I        pcs     │
│              I_I                │
└─────────────────────────────────┘
```

Press the **UNIT** key to select the sample size from 10, 20, 50 and 100.

Sampling

Put on some samples with a sample size the same as the current displaying one. Then press the **SMPL** key and the displayed value starts flickering. Several seconds later, the display shows as below:

```
┌─────────────────────────────────┐
│                       Stable    │
│              I⌐I        pcs     │
│              I_I                │
└─────────────────────────────────┘
```

Take off the samples on the pan. The sampling operation is finished. Then the balance can be used for counting.

Press **MODE** key to return to normal weighing mode (Pressing **SMPL** key after it returns to weighing mode will bring back to counting mode and the unit weight data is still stored for use).

Note:
1. If a container needs to be used, press **TARE** key to subtract its weight before entering into the counting mode.
2. If the unit weight is too small (less than 0.2 of a scale division), the display will show: --or-- PCS.

4.4 Percent (%) weighing mode

In normal weighing mode, press the **MODE** key twice to enter into percent weighing mode.

```
┌─────────────────────────────────────┐
│ Zero                                 │
│                  ┃□□.□        Stable  │
│                               %       │
└─────────────────────────────────────┘
```

Press **UNIT** or **TARE** key to change to "100.00%".

Sampling

Put the item to be considered 100% on the pan and press the **SMPL** key. Then the displayed value starts flickering. Several seconds later, it stops flickering.

Take off all the weight on the pan and the display shows as below:

```
┌─────────────────────────────────────┐
│ Zero                                 │
│                  □.□□        Stable   │
│                              %        │
└─────────────────────────────────────┘
```

Then the sampling operation is finished. The balance can used for percent weighing.

Press **MODE** key to return to normal weighing mode. (Pressing **SMPL** key after it returns to weighing mode will bring back to percent weighing mode and the unit weight data is still stored for use).

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Note:

1. If a container needs to be used, press **TARE** key to subtract its weight before entering into the counting mode.
2. If the unit weight is too small (less than 0.2 of a scale division), the display will show: --or-- PCS.
3. The memory of sampling size data will be cleared automatically every time the **MODE** key is used to select parts counting or percent weighing.

4.5 Density calculation mode (Optional)

The balance can calculate sample's density through measuring sample weight in air, weight in water and water's density in current temperature.
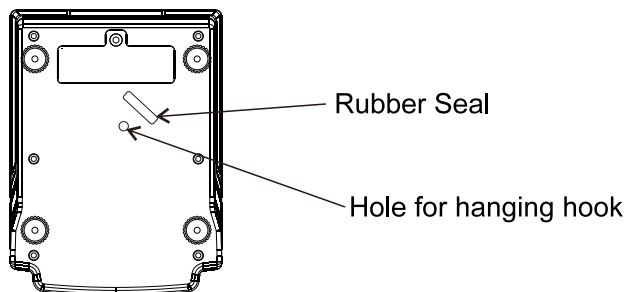
Procedure

Then follow the below procedure:

Press the **MODE** key in normal weighing mode to switch to density calculation mode. Then the display shows a temperature value.

The balance can be equipped with an optional hanging hook which can be used in Density Calculation mode.

1. Open the rubber seal on the bottom of the balance.

Rubber Seal

Hole for hanging hook

2. Install the hanging hook
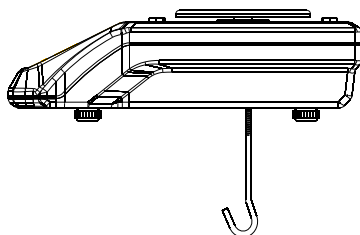
a. Choose water's temperature.

Use the thermometer to test water's temperature in current situation. Use **UNIT** key or **TARE** key to choose the corresponding temperature value. Press **ENTER** key to confirm. (The default value: 25℃.)

b. Then the display shows the water's density under the temperature you have chosen. And press **ENTER** key to confirm.

For example: 0.99705ρ-L

ρ-L: Indicate water density

c. Sample weight in air

Then the display shows "0.00g in-A". Hang the sample on the hook (If a container is used, press **TARE** key to subtract the container's weight first), the display will show the sample's weight in air.

In-A: Indicate weight in air

The display shows as below:

$$100.00 \quad \text{g in A}$$

Press **ENTER** key to confirm.

d. Sample weight in water

Then the display shows "0.00g in-L" .Hang the sample on the hook (If a container is used, hang the container on the hook and put it into the water, then press **TARE** key to subtract the container's weight first), and then put the sample in the water. The display will show a weight value, which indicates the sample's weight in water.

in-L: Indicate weight in water

The display shows as below:

$$97.04 \quad \text{g in L}$$

Press **ENTER** key to confirm.

e. Then the display will show a value which indicates the density of the sample. The density calculation is finished. (ρ-O: density of the sample)

For example: "33.6841ρ-O"

$$(\rho\text{-O} = \frac{100.00}{100.00\text{-}97.04} \times 0.99705)$$

$$\boxed{33.6841 \quad \rho\text{-O}}$$

Press **ENTER** key to confirm and do the density calculation of next object.

Press **MODE** key to exit from the density calculation mode and return to weighing mode.

Remarks:

1. The density unit is g/cm^3, so if the weighing unit is not "g" when entering into this mode, it will automatically be changed to "g". And when exiting from this mode, the weighing unit will be back to the original one.

2. Press **MODE** key to exit from this mode at any time.

3. Zeroing, Tarring and cancelling tare functions are available in this mode.

4. Density calculation formula:

$$\rho\text{-O} = \frac{W_A}{(W_A\text{–}W_L)} \times \rho\text{-L}$$

ρ-O------Density of the sample   ρ-L-------Density of the water

W_A——Sample weight in air W_L——Sample weight in water

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5. Press **ENTER** key in step "e" to do the density calculation for next object, the water temperature will be the same as the last one. But if exiting from this mode, the water temperature will be the default one when entering into the mode for the next time.

6. Water's density in different temperature

Tem. (℃)	Den. (g/cm3)	Tem. (℃)	Den. (g/cm3)	Tem. (℃)	Den. (g/cm3)	Tem. (℃)	Den. (g/cm3)
0	0.99984						
1	0.99990	11	0.99961	21	0.99799	31	0.99534
2	0.99994	12	0.99950	22	0.99777	32	0.99503
3	0.99996	13	0.99938	23	0.99754	33	0.99471
4	0.99997	14	0.99925	24	0.99730	34	0.99438
5	0.99996	15	0.99910	25	0.99705	35	0.99404
6	0.99994	16	0.99894	26	0.99679	36	0.99369
7	0.99990	17	0.99878	27	0.99652	37	0.99333
8	0.99985	18	0.99860	28	0.99624	38	0.99297
9	0.99978	19	0.99841	29	0.99595	39	0.99260
10	0.99970	20	0.99821	30	0.99565	40	0.99222

5. Parameters Set-up

The parameter set-up menus allow the balance to be set as required by the user.

Press the **MODE** and **ENTER** key at the same time, and hold for 2 seconds, then the display will enter into parameter setting mode.

5.1 Span calibration

The display shows as below:

```
CAL.
```

Press **UNIT** or **TARE** key to move to last setting or next setting; or press **ENTER** key to enter into current setting.

Use **BL** key to move the digit; use the **UNIT** or **TARE** key to key in the calibration weight value (preferably 2/3 to full capacity).

```
0200.00   Stable
             g
```

After the weight value has been set, press **ENTER** key and the value starts flickering. Then put on the mass which is the same weight as the display showing. When the display is stable, it will count down to zero automatically. Take off the mass. The calibration is finished.

Then press the **ENTER** key to confirm and return to normal weighing mode or press the **TARE** key to move to next setting.

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5.2 To choose the initial unit

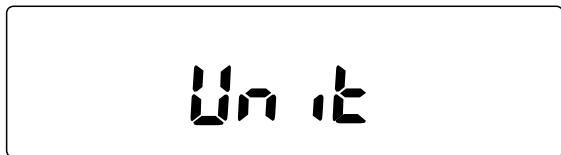The display show as below:
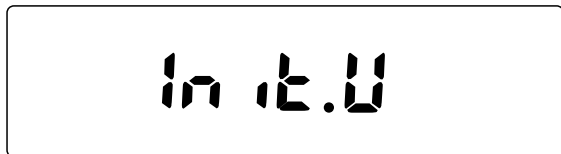
In it.U

Press **UNIT** or **TARE** key to move to last setting or next setting; or press **ENTER** key to enter into current setting.

Press the **UNIT or TARE** key to choose the unit: ct, lb, oz, dr, GN, ozt, dwt, MM, tl.J, tl.T, tl.H, t, g **(Default: g)**

Then press the **ENTER** key to confirm and move to next setting or press the **TARE** key to move to next setting.

5.3 To choose the weighing units enabled
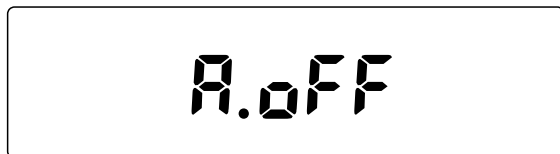
The display show as below:

Un it

Press **UNIT** or **TARE** key to move to last setting or next setting; or press **ENTER** key to enter into current setting.

Press the **UNIT or TARE** key to choose the unit: ct, lb, oz, dr, GN, ozt, dwt, MM, tl.J, tl.T, tl.H, t, g; press **BL** key to set the unit to be on or off ("ON" to enable the unit, "OFF" to disable the unit) **(Default: On)**

Then press the **ENTER** key to confirm and move to next setting or press the **TARE** key to move to next setting.

5.4 To choose the Auto. off time
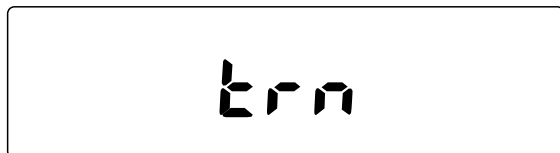
The display show as below:

$$A.oFF$$

Press **UNIT** or **TARE** key to move to last setting or next setting; or press **ENTER** key to enter into current setting.

Press the **UNIT or TARE** key to choose the Auto. off time from 2m, 5m, 8m or no (Disabled to auto. off). **(Default: no)**

Then press the **ENTER** key to confirm and move to next setting or press the **TARE** key to move to next setting.

5.5 To choose RS-232 transmission method

The display show as below:

$$trn$$

Press **UNIT** or **TARE** key to move to last setting or next setting; or press **ENTER** key to enter into current setting.

Press the **UNIT or TARE** key to choose transmission method.

(Default: Close)

tr.П.LP = used for LP50 printer (pressing **PRINT** key)

tr.П.dt = used for GODEX BP DT-4 printer (pressing **PRINT** key)

tr.П.PC = used for PC (pressing PRINT key)

tr.SEr =continuous transmission

Then press the **ENTER** key to confirm and move to next setting or press the **TARE** key to move to next setting.

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5.6 Label format

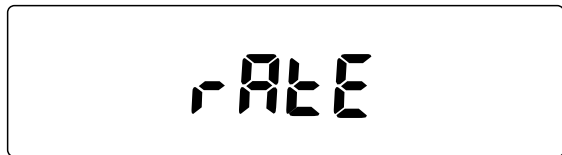The display show as below:

$$\boxed{\text{LAbEL}}$$

Press **UNIT** or **TARE** key to move to last setting or next setting; or press **ENTER** key to enter into current setting.

Use **BL** key to move the digit; use the **UNIT** or **TARE** key to key in the digits: FORM00-FORM99. **(Default: FORM00)**

Then press the **ENTER** key to confirm and move to next setting or press the **TARE** key to move to next setting.

5.7 To choose Baud Rate

The display show as below:

$$\boxed{\text{rAtE}}$$

Press **UNIT** or **TARE** key to move to last setting or next setting; or press **ENTER** key to enter into current setting.

Press the **UNIT or TARE** key to choose the desired baud rate: "1200", "2400", "4800" or "9600".   **(Default: 9600)**

Then press the **ENTER** key to confirm and move to next setting or press the **TARE** key to move to next setting.

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5.8 Data bits

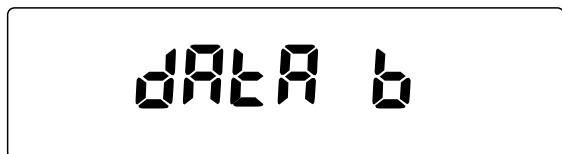The display show as below:

$$dAtA\ b$$

Press **UNIT** or **TARE** key to move to last setting or next setting; or press **ENTER** key to enter into current setting.

Press the **UNIT or TARE** key to choose the data bits to be 7 (b t.E7) or 8 (b t.n8)). **(Default: 8)**

b t.E7: data bits 7, even parity bit

b t.n8: data bits 8, no parity bit

Then press the **ENTER** key to confirm and move to next setting or press the **TARE** key to move to next setting.

5.9 To choose U.Wt recomputing

The display show as below:

$$AC\ \ \ y$$

Press **UNIT** or **TARE** key to move to last setting or next setting; or press **ENTER** key to enter into current setting.

Press the **UNIT or TARE** key to choose to be enabling (y) or disabling (n). **(Default: n)**

Then press the **ENTER** key to confirm and move to next setting or press the **TARE** key to move to next setting.

5.10 Backlight mode

The display show as below:

```
┌─────────────────────────────┐
│                             │
│         bL. 1               │
│                             │
└─────────────────────────────┘
```
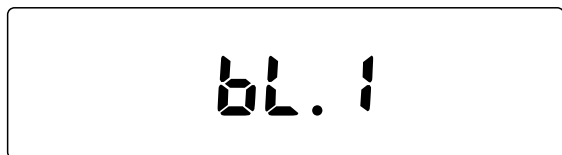
Press **UNIT** or **TARE** key to move to last setting or next setting; or press **ENTER** key to enter into current setting.

Press the **UNIT or TARE** key to choose the backlight mode: BL.1, BL.2 and BL.3. **(Default: BL.1)**

BL.1: The backlight will be on automatically when a load exceeds 10e on the pan or pressing a key.

BL.2---The backlight will always be on.

BL.3---The backlight will always be off.

Then press the **ENTER** key to confirm and return to normal weighing mode or press the **TARE** key to move to next setting.

Note:

When the scale is in the parameter setting mode, pressing **ENTER** key means the selected setting value is confirmed.

When the scale is in the parameter setting mode (any type of setting mode), pressing **BACK** key will return to normal weighing mode without making a change.

6. RS – 232 Interface

6.1 Mode: Standard EIA-RS-232 C's UART signal

6.2 Format:

Baud rate: 1200, 2400, 4800, 9600

Data bits: 7/8 BITS

Stop bit: 1 BIT

Code: ASCII

RS-232 connector is a 9 pin D-subminiature socket.

Input Pin   2

Output Pin   3

Signal Ground Pin   5

6.3 Data format

HEAD 1,   HEAD 2 ,   DATA   UNIT
<CR><LF>

 1 2   3   4 5   6   7 8 9 10 11 12 13 14   15 16 17 18   19 20

HEAD1 (2 BYTES)   HEAD2 (2 BYTES)

OL - Overload, under load   NT – NET Mode

ST - Display is stable   US - Display is unstable

DATA (8 BYTE)

2C (HEX) = "," (COMMA)   0D (HEX) = <CR>

2D (HEX) = "-" (MINUS)   0A (HEX) = <LF>

2E (HEX) = "." (DECIMAL POINT)

20 (HEX) = "   " (SPACE)

UNIT (4 BYTE), text for units selected, may include leading
spaces.

EXAMPLES:

EX: +0.876g, when it is stable and net value as:

ST, NT, +   0.876   g <CR><LF>

EX: -1,568lb, when it is unstable and net value as:

US, NT, -   1.586   lb <CR><LF>

6.4 Data format of Density calculation:

It is available when the transmission method is set to be "tr.ser".

ρ-L: 0.99705 g/cm3   Press **PRINT** key to confirm water density.

W_A: 127.19g   Press **PRINT** key to confirm sample weight in air.

W $_L$: 92.87 g   Press **PRINT** key to confirm sample weight in water.

ρ-O: 3.69615 g/cm3   Press **PRINT** key to confirm sample density.

ρ-O------Density of the sample   ρ-L-------Density of the water

W_A-------Sample weight in air   W $_L$-------Sample weight in water

6.5 Variables

No.	Variable Name		Specification	Application mode	Size
	LP-50	DT			
1	NWA	V0	Net weight (with ".")	W/C/%	7
2	NWB	V1	Net weight	W/C/%	6
3	TWA	V2	Tare weight (with ".")	W/C/%	7
4	TWB	V3	Tare weight	W/C/%	6
5	GWA	V4	Gross weight (with ".")	W/C/%	7
6	GWB	V5	Gross weight	W/C/%	6
7	QUA	V6	Quantity/Percentage (.)	C/%	7
8	QUB	V7	Quantity/Percentage	C/%	6
9	UWA	V8	Unit weight (with ".")	C	7
10	UWB	V9	Unit weight	C	6
11	UNT	V10	Weighing Unit	W/C/%	3

7. Error Message

During operation, the scale may show some error messages.

Codes	Possible Causes
E1	EPROM data loss or MCU is damaged
E2	The zero of the load cell is out of the initial zero range.
E5	The sample weight is not enough
OL	Overload

Correct your operation and contact the dealer or manufactory for further assistance.

8. Weight Conversion

Conversion Units Table for Weights

1 ct (Metric. Carat)	=	0.1999694 g
1 oz (AVOIRDUPOIS OUNCE)	=	28.349523 g
1 GN (GRAIN) (UK)	=	0.0647989 g
1 ozt (TROY OUNCE)	=	31.103476 g
1 dwt (PENNYWEIGHT)	=	1.555174 g
1 t (TOLA, India)	=	11.663804 g

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