# Compact Precision Scale

## HT-120

# INSTRUCTION MANUAL

**A&D**

A&D Company, Ltd.

# SAFETY PRECAUTIONS

All safety messages are identified by the following, "**WARNING**" or "**CAUTION**", of ANSI Z535.4 (American National Standard Institute: Product Safety Signs and Labels). The meanings are as follows:

| ⚠ **WARNING** | A potentially hazardous situation which, if not avoided, could result in death or serious injury. |
|---|---|
| ⚠ **CAUTION** | A potentially hazardous situation which, if not avoided, may result in minor or moderate injury. |

❑ This manual is subject to change without notice at any time to improve the product.
❑ Product specifications are subject to change without any obligation on the part of the manufacture.
❑ When using the scale, the following safety precautions should always be followed.

## ⚠ WARNING

**Repairs**

Do not disassemble the scale. Contact your local A&D dealer if your balance needs service or repair.

**Troubleshooting**

If a problem has occurred and you cannot clear it, stop using the scale, place a notice on the scale and request service from the store where you purchased the balance or from your local A&D dealer.

## ⚠ CAUTION

**Conditions for use and Ambient Temperature**

❑ The scale is a precision instrument. Avoid installing the scale in direct sunlight, excessive dust, high humidity, high temperature, large temperature fluctuations or magnetic fields, which may cause problems or malfunctions.
❑ Drafts and vibration may cause excessive weighing errors.
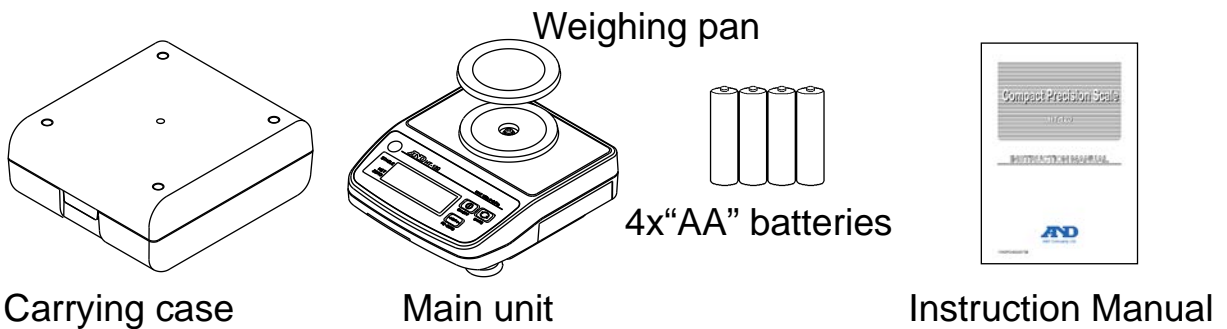❑ Use the scale range of the -10°C to 40°C, with less than 85% R.H.

**Operation**

❑ Avoid mechanical shock to the scale, especially to the weighing pan. That could cause damage.
❑ Avoid overloading that could cause damage to the scale.
❑ The scale is not waterproof type. Water invading into the scale may cause damage.
❑ If the scale is not to be used for a long period of time, remove all batteries from the battery compartment to avoid battery leakage.
❑ Do not mix batteries made by different manufactures, or mix old and new batteries. Replace all of the batteries at one time.
❑ Use only the specified AC adapter for the scale (AC adapter is optional).
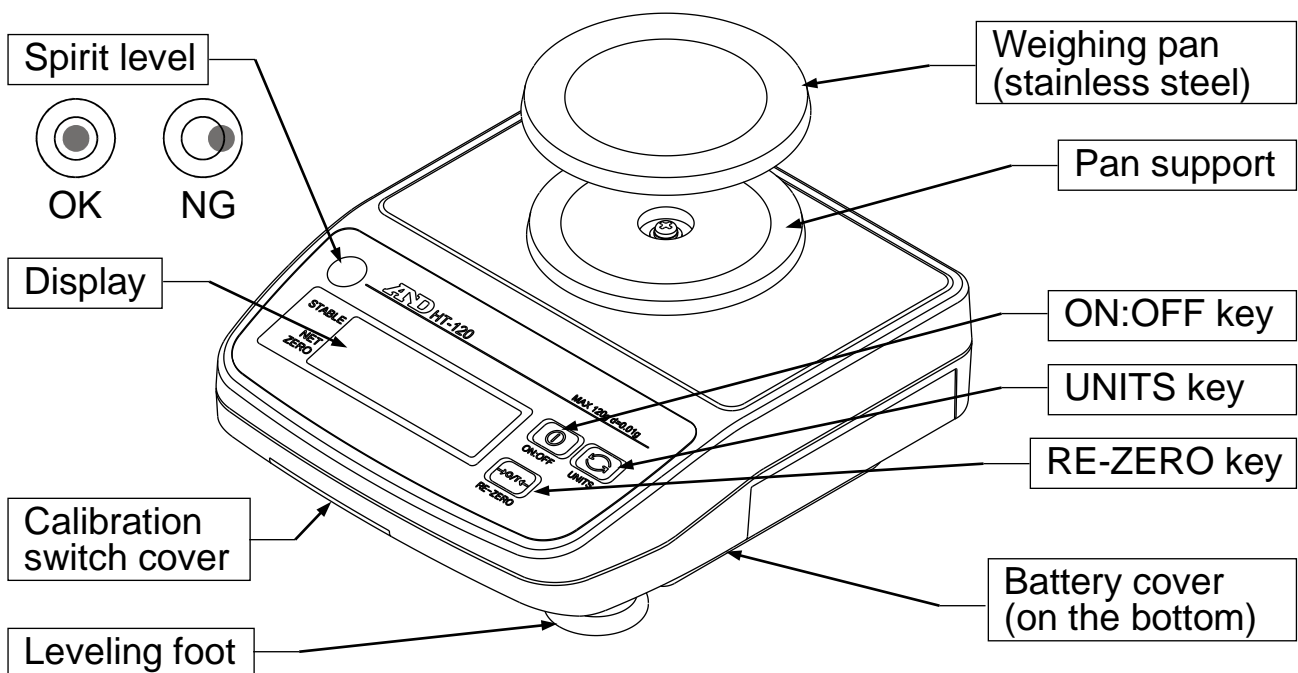
## Compliance with FCC rules

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 Class A digital devices pursuant to 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 may 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.)

# UNPACKING

Check whether all of the following items are included:

Weighing pan



Carrying case          Main unit          4x"AA" batteries          Instruction Manual

# PARTS DESCRIPTION



Spirit level

OK          NG

Display

Calibration switch cover

Leveling foot

Weighing pan (stainless steel)

Pan support

ON:OFF key

UNITS key

RE-ZERO key

Battery cover (on the bottom)

(Adjust the leveling feet as the bubble is in the middle of the circle.)

Security slot

(Use a security cable commercially available.)

AC adapter jack

(Use a correct AC adapter for your local voltage and receptacle type.)

STABLE indicator

NET indicator

ZERO indicator

Battery indicator

Weighing units
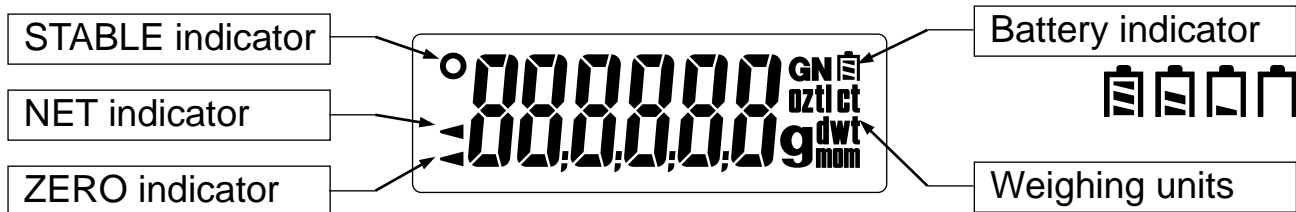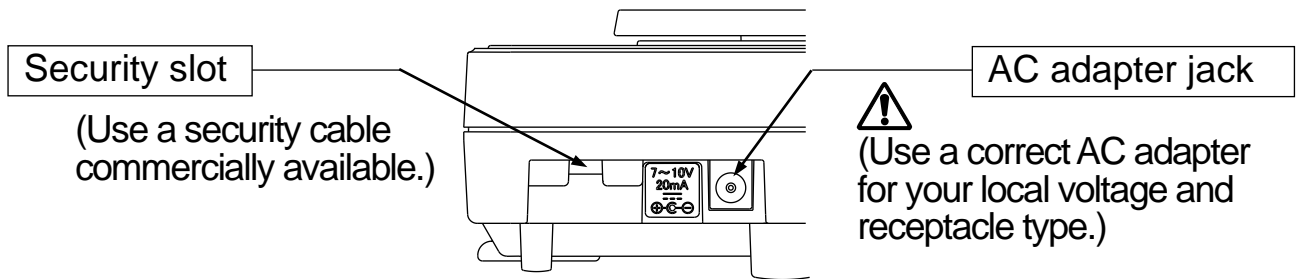
| | |
|---|---|
| ON:OFF key | Turns the scale power on/off. |
| RE-ZERO key | Sets the display to zero. When the weight is within ±2% of the weighing capacity to the zero point at the power-on, the key will zero the scale. When the weight exceeds +2%, it will be subtracted as tare weight. |
| MODE key | Changes the weighing units. |
| STABLE indicator | Turns on when the weight reading is stable. |
| NET indicator | Turns on when the net weight is displayed. |
| ZERO indicator | Turns on at the center of zero point. At the net weight zero point, both the ZERO and NET turn on. |
| Battery indicator | Shows the remaining battery level in 4 steps when operated by batteries. |

# PREPARATION

## Installing Batteries

Step 1   Remove the battery cover.

Step 2   Insert 4 new batteries into the battery compartment, taking care of the polarities.
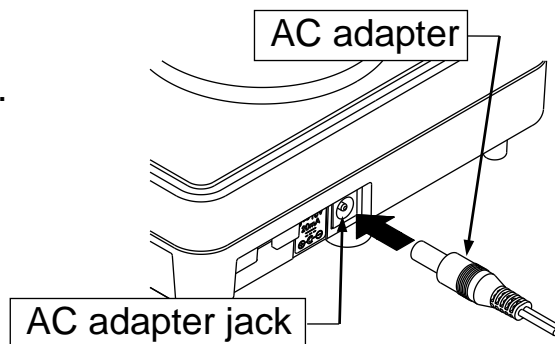
Step 3   Replace the battery cover.

Note   The batteries provided with the scale are for testing the performance of the scale and may have a limited life.

Battery cover

Step 1

4 new batteries
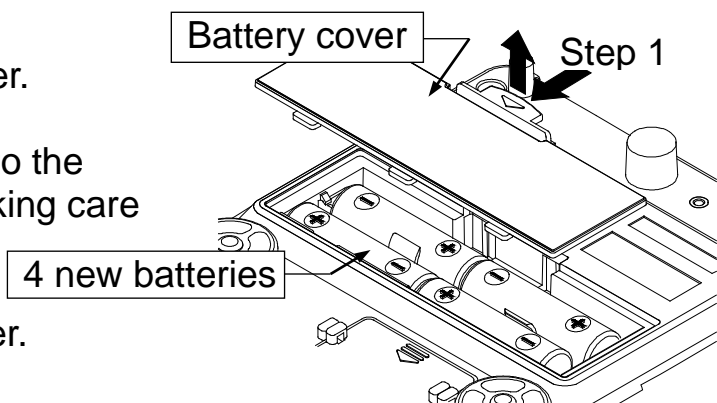
## When Using the AC adapter

Step 1 Verify that the AC adapter is correct.

Step 2 Plug the AC adapter into the
AC adapter jack.

## Possibility of Electrostatic Influence

When the ambient humidity gets low, plastics and insulators will be easily charged. That may make the reading unstable and cause some errors. To reduce the electrostatic influence, ground the scale using a threaded screw hole on the bottom.
A ground wire and a screw are not included.
The depth of the screw hole is 8 mm and prepare an M3 screw so as to fit the hole.
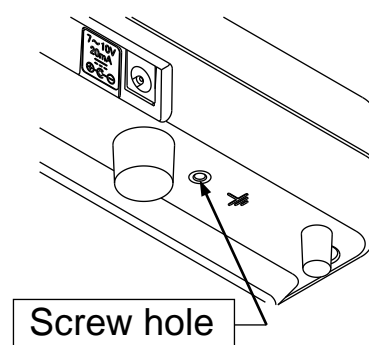
# WEIGHING

Step 1 Press the | ON:OFF | key to turn the scale on. The scale displays all segments for a few seconds and shows zero.
Press the | ON:OFF | key again to turn the scale off.

Step 2 Press the | UNITS | key to select an appropriate weighing unit.
The scale will power up with the same weighing unit as the one in use when turned off last time.

Step 3 Verify that the reading is zero. If not, press the | RE-ZERO | key to zero the display. When you use a container for weighing, place an empty container on the weighing pan and press the | RE-ZERO | key to zero the display.

Step 4 Place objects to be weighed on the weighing pan or in the container.
Wait for the STABLE O to be displayed and read the value.

## Errors

| | |
|---|---|
| $E$ | Overload. Remove object from the weighing pan. |
| `------` | Out of range or unstable error. There is a load beyond the zero range at the power-on. When pressed the RE-ZERO key or powered on, unstable weighing shows this display either. |
| $Lb$ | Low battery. Replace batteries with four new ones immediately. |
| $CAL\ E$ | Calibration error. Unstable weighing or incorrect calibration weight. |
| $Err\ \#$ | Internal errors (# shows an error number). Request service. |

# FUNCTIONS

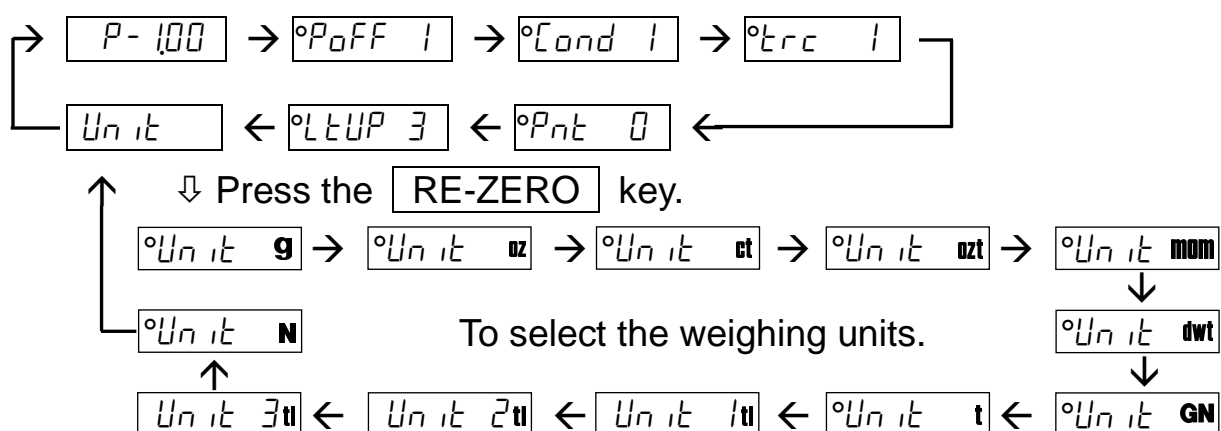## Entering the Function Settings

Turn the scale turned off and press the ON:OFF key while pressing the RE-ZERO key. Then, the display will show the software version $P-1.00$ ("1.00" is an example and may be a different number.) This is the starting point of the function settings.

## Key Operation

| | |
|---|---|
| UNITS key | To select a function item. |
| RE-ZERO key | To change the parameter of each item. |
| ON:OFF key | To finish the operation and turns off the scale. |

Starting at the software version display, each function item appears cyclically by pressing the UNITS key.

$P-1.00 \rightarrow PoFF\ 1 \rightarrow Cond\ 1 \rightarrow trc\ 1$

$Unit \leftarrow LtUP\ 3 \leftarrow Pnt\ 0 \leftarrow$

⇓ Press the RE-ZERO key.

$Unit\ \textbf{g} \rightarrow Unit\ \textbf{oz} \rightarrow Unit\ \textbf{ct} \rightarrow Unit\ \textbf{ozt} \rightarrow Unit\ \textbf{mom}$

$Unit\ \textbf{N}$    To select the weighing units.    $Unit\ \textbf{dwt}$

$Unit\ \textbf{3tl} \leftarrow Unit\ \textbf{2tl} \leftarrow Unit\ \textbf{1tl} \leftarrow Unit\ \textbf{t} \leftarrow Unit\ \textbf{GN}$

"→", "←", "↓" and "↑" show the movement by the UNITS key.
While the display shows function item, press the RE-ZERO key to change the setting.
To finish the settings, press the ON:OFF key to turn off the scale.

# Automatic Power Off Function

If the scale is left ON and the STABLE O is displayed, the automatic power-off function turns power off after approximately 5 minutes.

| | |
|---|---|
| PoFF 0 | Automatic power off function is disabled. |
| PoFF 1 | Automatic power off function is enabled. (factory default) |

# Setting the Response/Stability Condition

This function is to specify the response speed and to stabilize the weight value reducing the influence of ambient environment like vibration. But note that the setting is a trade-off between response and stability.

| | |
|---|---|
| Cond 0 | Fast response / Sensitive to the vibration |
| Cond 1 | Normal condition for both response and stability (factory default) |
| Cond 2 | Slow response / Insensitive to the vibration |

# Setting the Zero Tracking Function

This function is to automatically track small zero drift caused by changes in the ambient environment.

| | |
|---|---|
| trc 0 | Zero tracking function is disabled. |
| trc 1 | Zero tracking function is enabled. (factory default) |

# Selecting the Decimal Point

This function is to select the decimal separator.

| | |
|---|---|
| Pnt 0 | "." (period) (factory default) |
| Pnt 1 | "," (comma) |

# Setting the LCD Backlight Operation

This function is to control how the LCD backlight turns off. When the weight data becomes and stays stable for some seconds, the backlight will automatically turn off. The weight change or the key operation will turn the backlight on (except the settings "always on" and "always off").

| | |
|---|---|
| LtUP 0 | Backlight is always off. |
| LtUP 1 | Backlight turns off 5 seconds after STABLE turning on. |
| LtUP 2 | Backlight turns off 10 seconds after STABLE turning on. |
| LtUP 3 | Backlight turns off 30 seconds after STABLE turning on. (factory default) |
| LtUP 4 | Backlight turns off 60 seconds after STABLE turning on. |
| LtUP 5 | Backlight is always on. |

# Setting the Weighing Units to Use

❑ The scale has the weighing units listed in the table below and the units to be used only can be selected. Set the weighing units enabled or disabled as appropriate.

❑ There are three types of taels, HK general/Singapore tael, HK jewelry tael and Taiwan tael. But one of them can be selected.

❑ The order of units to be displayed is as in the table and it cannot be changed.

| UNITS | key       To select the unit to be set.

| RE-ZERO | key    To set the displayed unit enabled or disabled.

The STABLE O indicates the displayed unit enabled.
ex. | °Unit   g | shows "g" enabled. | Unit   g | shows "g" disabled.

| Unit | Unit name | Conversion to gram | At setting mode |
|---|---|---|---|
| g | Gram | 1 g | °Unit   **g** |
| oz | Ounce (avoir) | 28.349523125 g | °Unit   **oz** |
| ct | Metric carat | 0.2 g | °Unit   **ct** |
| ozt | Troy ounce | 31.1034768 g | °Unit   **ozt** |
| mom | momme | 3.75 g | °Unit   **mom** |
| dwt | Pennyweight | 1.55517384 g | °Unit   **dwt** |
| GN | Grain (UK) | 0.06479891 g | °Unit   **GN** |
| t | Tola (India) | 11.6638038 g | °Unit   **t** |
| tl | Tael (HK general) | 37.7994 g | °Unit   **1 tl** |
| | Tael (HK jewelry) | 37.4290 g | Unit   **2 tl** |
| | Tael (Taiwan) | 37.5 g | Unit   **3 tl** |
| N | Newton | See below. | °Unit   **N** |

❑ HK = Hong Kong. HK tael (general) is equal to Singapore tael.

❑ Newton is a value calculated as follows:

Newton = (weight in gram) x (9.80665 m/s$^2$) / 1000.

# CALIBRATION

## When is Calibration Required?

Calibration may be required when the scale was initially installed or has been moved to another location.

Calibration switch

Calibration switch cover
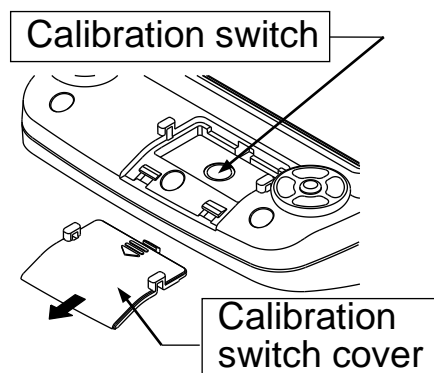
## Calibration Using a Calibration Weight

Step 1  Press the Calibration switch while the scale is in the weighing mode. Then, $\boxed{\mathit{CAL}}$ will be displayed.

Step 2  Press the $\boxed{\text{RE-ZERO}}$ key and $\boxed{\mathit{CAL} \quad \mathit{0}_g}$ will be displayed. With nothing on the weighing pan, press the $\boxed{\text{RE-ZERO}}$ key.

Step 3  The display shows $\boxed{\mathit{CAL}}$ blinking while waiting for the weighing value to be stable. When becoming stable, the scale perform zero calibration and will show $\boxed{\mathit{CAL} \ \mathit{100}_g}$ (factory default) with tens place digit blinking).
Select the next step as follows:
❑ Proceed to the span calibration of Step 4.
❑ Press the $\boxed{\text{ON:OFF}}$ key to finish the procedure without performing the span calibration.

Step 4  At the display $\boxed{\mathit{CAL} \ \mathit{100}_g}$, place the calibration weight 100 g (±2 mg) on the center of the weighing pan and press the $\boxed{\text{RE-ZERO}}$ key.

❑ To use the other calibration weight (50 g or more recommended), press the $\boxed{\text{UNITS}}$ key to change by 10 g and place the weight equal to the displayed value.

Step 5  The display shows $\boxed{\mathit{CAL}}$ blinking while waiting for the weighing value to be stable. When becoming stable, the scale perform span calibration and will show $\boxed{\mathit{End}}$. Remove the calibration weight and press the $\boxed{\text{ON:OFF}}$ key to finish the procedure.

# Gravity Acceleration Compensation

The scale is calibrated with the gravity acceleration value 9.7985 m/s$^2$ at the factory. When the gravity acceleration at your location is different value, you should calibrate the scale using a calibration weight. But if the calibration weight cannot be prepared, change the gravity acceleration of your scale to the value of the area where the scale is used. See "The Value of Gravity Acceleration at Various Locations" of this manual.

Step 1 Start from $\boxed{\text{CAL}}$ display at the Step 1 of "Calibration Using a Calibration Weight", and press the $\boxed{\text{UNITS}}$ key and the current acceleration value will be displayed. ex. $\boxed{9.7985}$

Step 2 Press the $\boxed{\text{RE-ZERO}}$ and the digit that can be changed starts to blink. Change the value with following keys.

$\boxed{\text{RE-ZERO}}$ key To increment the blinking digit.
$\boxed{\text{UNITS}}$ key To move the blinking digit.

Step 3 After setting the new value, press the $\boxed{\text{RE-ZERO}}$ key while pressing the $\boxed{\text{UNITS}}$ key. Then, the display will show $\boxed{\text{End}}$ for a second and stop blinking the value. Press the $\boxed{\text{ON:OFF}}$ key to finish the procedure.

# Restoring the Calibration Data

The zero calibration, span calibration and gravity acceleration values can be restored to the factory default values.
Ex. The scale was calibrated with wrong weight, but there is no correct weight. The values above can be reset to the factory default.
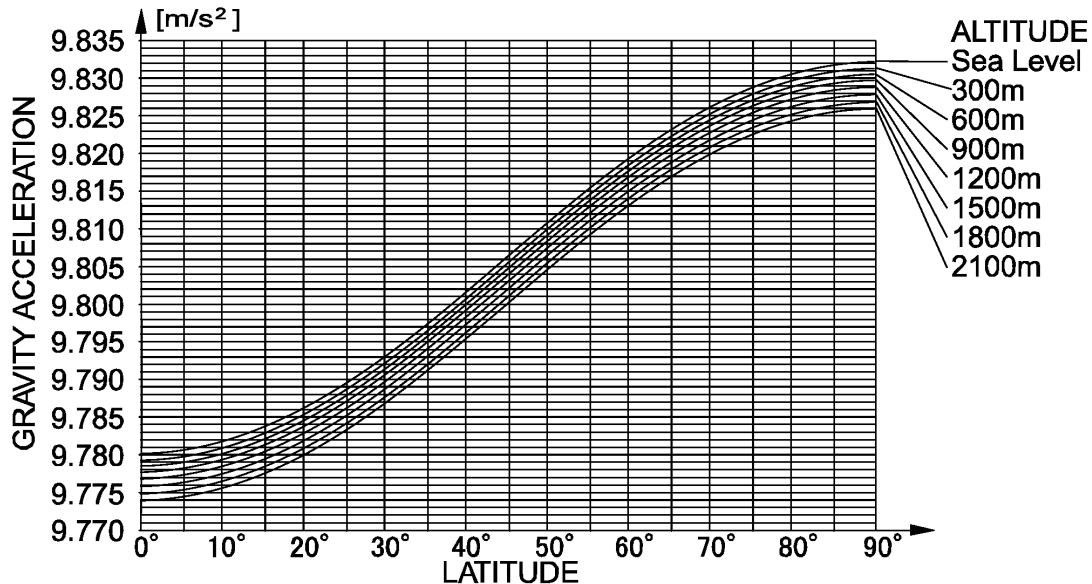
Step 1 Start from $\boxed{\text{CAL}}$ display at the Step 1 of "Calibration Using a Calibration Weight", and press the $\boxed{\text{UNITS}}$ key twice to display $\boxed{\text{Clr}}$ .

Step 2 Press the $\boxed{\text{RE-ZERO}}$ key, then the display will show $\boxed{\text{Clr no}}$.
Press the $\boxed{\text{RE-ZERO}}$ key again to display $\boxed{\text{Clr Go}}$ to restore.

Step 3 At the display $\boxed{\text{Clr Go}}$, press the $\boxed{\text{RE-ZERO}}$ key while pressing the $\boxed{\text{UNITS}}$ key. Then, the display will show $\boxed{\text{End}}$ for a second and automatically return to $\boxed{\text{Clr}}$ .
Press the $\boxed{\text{ON:OFF}}$ key to finish the procedure.

❏ If perform the step 3. to the display $\boxed{\text{Clr no}}$, the display will return to $\boxed{\text{Clr}}$ without showing $\boxed{\text{End}}$ .

# SPECIFICATIONS

| MODEL | HT-120 |
|---|---|
| Weighing capacity | 120 g |
| Resolution | 0.01 g |
| Non-linearity | ± 0.02 g |
| Repeatability | 0.01 g (Std. deviation) |
| Span drift | 50 ppm/°C (5°C to 35°C / 41°F to 95°F) |
| Operating temp. | -10°C to 40°C / 14°F to 104°F, Less than 85%RH |
| Display | 15 mm / 0.59 inches, 7segment LCD with backlight |
| Display update | Approximately 10 times per second |
| Power supply | 4 x "AA" batteries (R6P / LR6) or AC adapter (option) |
| Battery life | Approx. 500 hours with alkaline cells at 20°C / 68°F (backlight off) |
| Pan size | $\phi$ 70 mm / $\phi$ 2.76 inches |
| Dimensions | 136 (W) x 150 (D) x 57.5 (H) mm 5.35 (W) x 5.91 (D) x 2.26 (H) inches |
| Net weight | Approximately 500 g / 1.1 lb |
| Max. Tare weight | 120 g |
| Calibration weight | 100 g (factory default) |
| Accessories | This manual, 4x"AA" batteries (for operation check) |
| Option | AC adapter (contact your dealer) |

# The Value of Gravity Acceleration at Various Locations

| | | | |
|---|---|---|---|
| Amsterdam | 9.813 m/s$^2$ | Madrid | 9.800 m/s$^2$ |
| Athens | 9.807 m/s$^2$ | Manila | 9.784 m/s$^2$ |
| Auckland NZ | 9.799 m/s$^2$ | Mexico City | 9.779 m/s$^2$ |
| Bangkok | 9.783 m/s$^2$ | Milan | 9.806 m/s$^2$ |
| Brussels | 9.811 m/s$^2$ | New York | 9.802 m/s$^2$ |
| Buenos Aires | 9.797 m/s$^2$ | Oslo | 9.819 m/s$^2$ |
| Calcutta | 9.788 m/s$^2$ | Ottawa | 9.806 m/s$^2$ |
| Cape Town | 9.796 m/s$^2$ | Paris | 9.809 m/s$^2$ |
| Chicago | 9.803 m/s$^2$ | Rio de Janeiro | 9.788 m/s$^2$ |
| Copenhagen | 9.815 m/s$^2$ | Rome | 9.803 m/s$^2$ |
| Cyprus | 9.797 m/s$^2$ | San Francisco | 9.800 m/s$^2$ |
| Djakarta | 9.781 m/s$^2$ | Singapore | 9.781 m/s$^2$ |
| Frankfurt | 9.810 m/s$^2$ | Stockholm | 9.818 m/s$^2$ |
| Istanbul | 9.808 m/s$^2$ | Sydney | 9.797 m/s$^2$ |
| Havana | 9.788 m/s$^2$ | Taipei | 9.790 m/s$^2$ |
| Helsinki | 9.819 m/s$^2$ | Tokyo | 9.798 m/s$^2$ |
| Kuwait | 9.793 m/s$^2$ | Vancouver, BC | 9.809 m/s$^2$ |
| Lisbon | 9.801 m/s$^2$ | Washington DC | 9.801 m/s$^2$ |
| London (Greenwich) | 9.812 m/s$^2$ | Wellington NZ | 9.803 m/s$^2$ |
| Los Angeles | 9.796 m/s$^2$ | Zurich | 9.807 m/s$^2$ |

Graph: GRAVITY ACCELERATION [m/s²] vs LATITUDE

Y-axis values: 9.770, 9.775, 9.780, 9.785, 9.790, 9.795, 9.800, 9.805, 9.810, 9.815, 9.820, 9.825, 9.830, 9.835

X-axis (LATITUDE): 0°, 10°, 20°, 30°, 40°, 50°, 60°, 70°, 80°, 90°

ALTITUDE
Sea Level
300m
600m
900m
1200m
1500m
1800m
2100m