



Contents

1	Compliance	3
1.1	Compliance with FCC rules	3
2	Outline and Features	4
3	Unpacking	5
3.1	Accessories and Options list	6
4	Caution	8
4.1	Precautions for Installing the Scale	8
4.2	Precautions for Operating the Scale	8
4.3	Precautions for Storing the Scale	8
5	Installing the Scale	9
5.1	Installing the batteries for Type L	10
6	Names	11
6.1	Display and Symbols	12
6.2	Switches	14
7	Basic Operation	16
7.1	Turning the Scale on/off and Weighing	16
7.1.1	Type V or Type L with AC adaptor	16
7.1.2	Type L with Batteries	17
7.2	Tare (and Net Display)	18
7.2.1	Semi-Automatic Tare (Input by Weighing)	18
7.2.2	Preset Tare (Digital Input of Known Tare)	18
7.3	Weighing Range	19
7.4	Mode Switch (Changing Unit and Mode)	20
8	Counting Mode	21
8.1	Storing a Unit Mass	21
8.2	Counting the number of articles	22
9	Percentage Mode	23
9.1	Storing a 100% Mass	23
9.2	Reading Percentage	24
10	Accumulation Function	25
10.1	Preparation (Setting Parameters)	26
10.2	Operation and Performance (Examples)	27
11	Comparator Function	28
11.1	Preparation (Setting Parameters)	29
11.2	Operation and Performance (Examples)	31
12.	Full/Dribble Batch Function	32
12.1	Preparation (Setting Parameters)	34
13.	Simple Batch Function	36
13.1	Preparation (Setting Parameters)	37
13.2	Operation and Performance (Examples)	38

14	Calibration (Adjusting the Scale).....	39
14.1	The Gravity Acceleration Table	40
14.2	The Complete Calibration Procedure	41
14.2.1	Gravity Acceleration Correction	41
14.2.2	Preparation	41
14.2.3	Calibration of the Zero Point.....	42
14.2.4	Span Calibration	42
15	The Function Table	43
15.1	The Procedure for Setting Parameters	43
15.2	Parameter List	44
16	RS-232C Serial Interface	48
16.1	Data Format	49
16.2	Stream Mode	51
16.2.1	Preparation and Performance (Examples)	51
16.3	Command mode	52
16.3.1	Command List	52
16.4	Preparation (Setting Parameters)	55
17	Options	56
17.1	RS-232C/ Relay output/ Buzzer (OP-03)	56
17.2	RS-422/ RS-485 / Relay output (OP-04)	57
17.2.1	Communication Format	59
17.2.2	Command List	59
17.3	Internal Printer for Type V (OP-06)	62
18	Specifications	65
19	Maintenance	68
19.1	Repair	68
19.2	Check points Before Calling Maintenance	68



1 Compliance



1.1 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 Sub-part J of Part 15 of FCC rules. These rules are designed to provide reasonable protection against interference when this 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.)



2 Outline and Features

The HV-G series is a platform scale with 1/3000 resolution, and has a “triple weighing range” function to select the weighing range.

Type L scales have an LCD (Liquid Crystal Display) and use batteries as a power source to provide portability. This type can also use an AC mains adaptor.

Type V scales have a fluorescent display so the weighing value can be read in dim light. This type uses the AC power line as a power source.

The base unit (platform) is water-resistant in accordance with IP-65 specifications.

The counting mode function converts the total mass value (total weight) of articles to be counted, to a count, assuming all items have the same mass.

The percentage mode function displays the mass of an item as a percentage of a stored 100% mass.

The accumulation function accumulates each weighing value and counts the number of weighings.

The comparator function compares the display value with the upper limit value (HI) and the lower limit value (LO) and displays the result. The result can output if option OP-03 is installed.

The simple batch function or full/dribble batch function can be used for filling to a target mass value. The status of a weighing value can be output if option OP-03 or OP-04 is installed. The outputs are Zero Band, Preliminary and Final.

The optional RS-422/RS-485 serial interface can control up to 16 scales from a computer when this option is installed in place of the standard RS-232C serial interface.

Type V scales can be equipped with option OP-06, a built-in impact dot matrix printer.

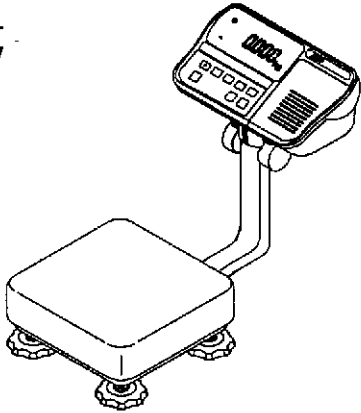


3 Unpacking

Products

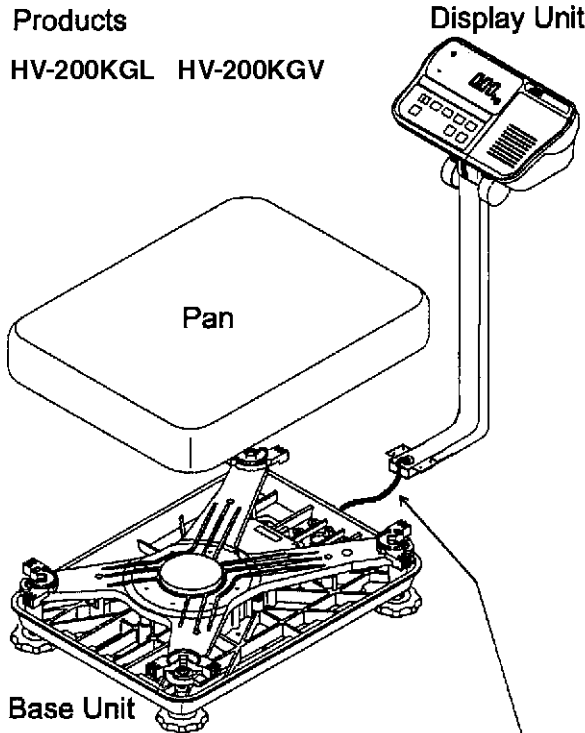
HV-15KGL

HV-15KGV



Products

HV-200KGL HV-200KGV

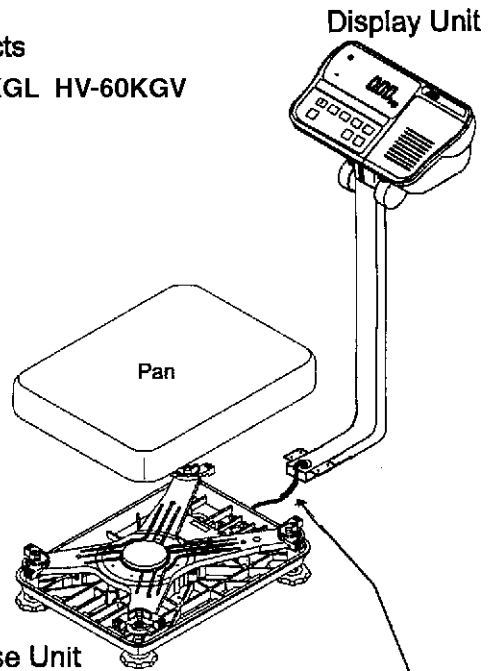


Caution

Do not pull the loadcell cable.

Products

HV-60KGL HV-60KGV

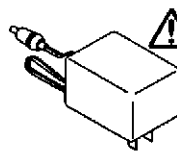


Caution

Do not pull the loadcell cable.

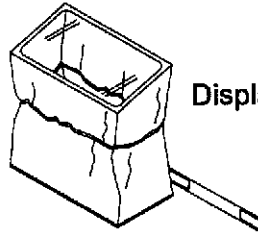
All Accessories

Refer to the accessories list on page 6. The combination of accessories depends upon the model.



AC Adaptor

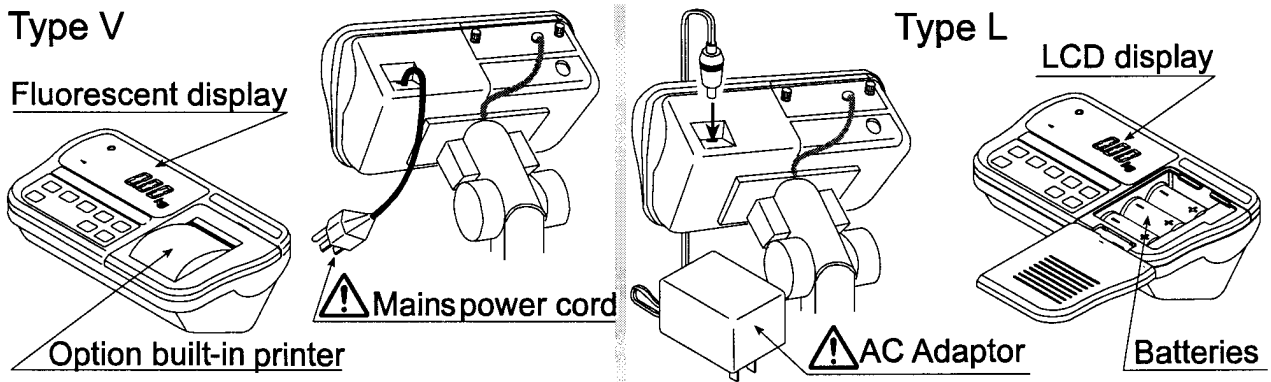
Please confirm that the AC adaptor type is correct for your local voltage and receptacle type.



Display unit cover



5mm allen wrench



Please confirm that the mains power type or AC adaptor type is correct for your local voltage and receptacle type.



3.1 Accessories and Options list

Accessories for HV-G series

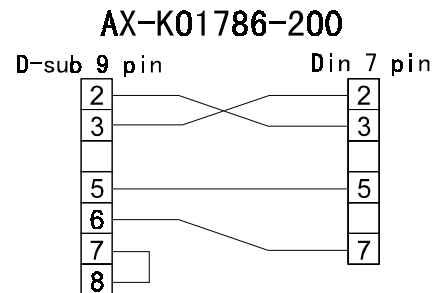
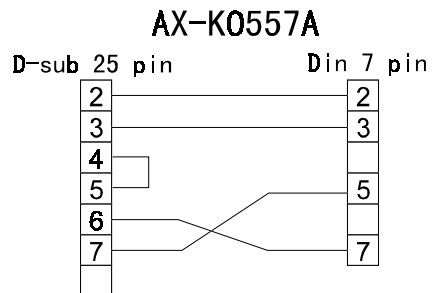
Type	Products	Accessories
Type V	HV-15KGV	Display unit cover Instruction manual
	HV-60KGV HV-200KGV	Display unit cover 5mm Allen wrench Instruction manual
Type L	HV-15KGL	Display unit cover AC adaptor 6 x 'D' size batteries Instruction manual
	HV-60KGL HV-200KGL	6 x 'D' size batteries Display unit cover 5mm Allen wrench AC adaptor Instruction manual

Options List

Order code or option name		Accessories
OP-03	RS232C interface / Relay output / Buzzer	Connector JA:TCP0586
OP-04	RS422/485 interface / Relay output	Connector TM:BLA9 AC adaptor
OP-06	Built-in printer for type V	Paper PP156 Ink ribbon ERC-05
AX-K0557A RS232C cable, D-sub 25 pin, 2m		
AX-KO1786-200 RS232C cable, D-sub 9 pin, 2m		

Consumables

AX-PP156	Special roll paper
AX-ERC-05	Ink ribbon





4 Caution



4.1 Precautions for Installing the Scale

Consider the following conditions to get the most from your scale.

The best operation is where the temperature and relative humidity are stable, the scale is installed on a solid floor or bench and there is no draft.

Do not install the scale in direct sunlight.

Do not install the scale near heaters or air conditioners.

Do not install the scale where there is flammable or corrosive gas present.

Do not install the scale near equipment which produces magnetic fields.

Do not install the scale where there is likely to be static electricity discharges in a place where the relative humidity is lower than 45%RH. Plastic and isolators are likely to be charged with static electricity.

The display unit is **not water resistant**. Use the display unit cover to avoid damage.

Do not use an unstable power source.



4.2 Precautions for Operating the Scale

Periodically check the scale with a known weight.

Calibrate the scale before using it and after moving it to another location.

Do not place anything on the pan which is heavier than the weighing capacity

Do not drop anything onto the pan.

Do not use a sharp instrument such as a pencil or ball-point pen to press the switches. Press the switches gently using only your finger.

We recommend pressing the **ZERO** or **TARE** switch before each weighing to prevent possible error.

Replace used dry cells with six new ones when the **BATT** symbol is displayed. Dry cell (battery) is size D.



4.3 Precautions for Storing the Scale

Do not disassemble the scale.

Do not use solvents to clean the scale.

For best cleaning of the display unit, wipe with a dry lint free cloth or a lint free cloth which is moistened with warm water and a mild detergent.

The base unit can be cleaned with gentle water jets while brushing the base unit.

Weigh only after the unit is dry.

Protect the display unit from dust and water by using the vinyl cover.

Remove batteries from display unit when the scale is not in use for a long time. If you leave the batteries installed they may leak and damage the scale.



5 Installing the Scale

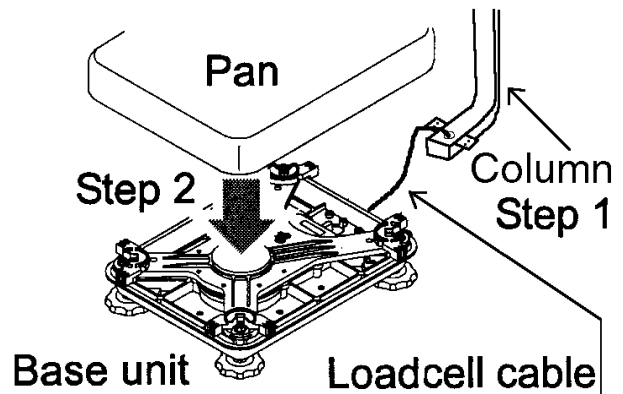
This procedure includes all of the steps for installing the HV-G series scales

Step 1 Unpacking

Remove the base unit and column from the carton, taking care not to pull on the loadcell cable.

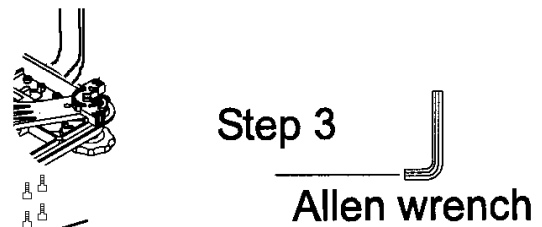
Step 2 Fit the pan to the base unit.

Step 3 Insert the excess loadcell cable into the column. Attach the column to the base unit so as not to damage the loadcell cable. Affix the column to the bracket using four 5mm Allen screws.



Step 4 Select the place for installing the scale.

Consider "4. Caution" on page 8.



Step 5 Level the base unit by using the "Bubble spirit level" and "Levelling feet".

5 mm Allen screws

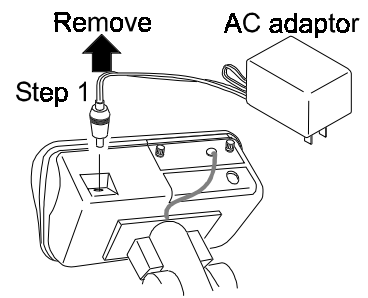
Step 6 Press the caps at the pole top from both sides and adjust the angle of the display unit.

Step 7 Check the weighing accuracy. If the scale needs calibration, refer to "14 Calibration".

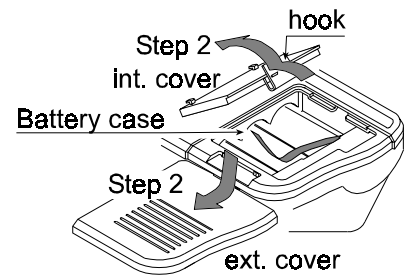


5.1 Installing the Batteries for Type L

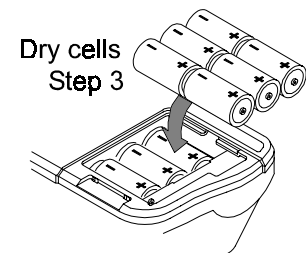
- Step 1 Turn off the display.
Remove the AC adaptor.



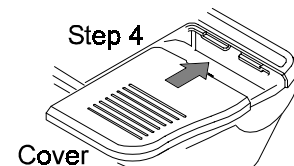
- Step 2 Press and slide to open the external cover.
Press the hook of the internal cover to the left side and lift the cover.



- Step 3 Insert six new dry cells ensuring correct polarity (+,-). Battery size is 'D'.



- Step 4 Close the covers opened in step 2.



Caution

Replace used dry cells with six new ones, when **BATT** is displayed. Do not mix used and new batteries. It may cause damage to the battery or product.

Check the polarity when installing the batteries. If you do not observe this it may cause battery leakage. Also if the polarity of a battery is wrong the scale may only work temporarily.

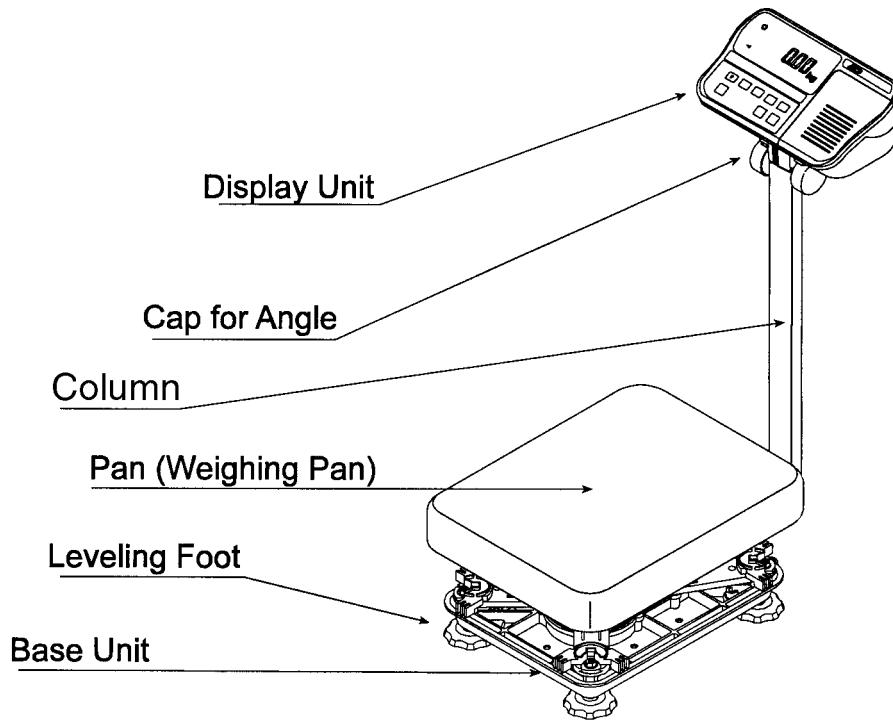
The battery life is dependent upon the environmental temperature.

Remove batteries from the display unit when the scale is not to be used for a long time. They may leak and cause damage.

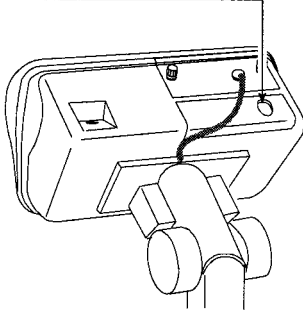
Damage which is due to battery leakage is not covered under warranty.



6 Names

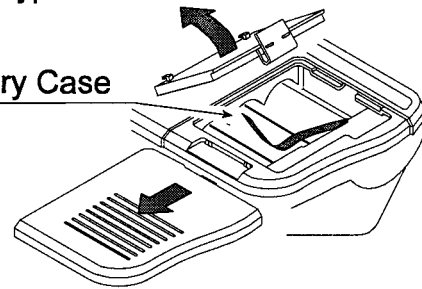


RS-232C Interface connector

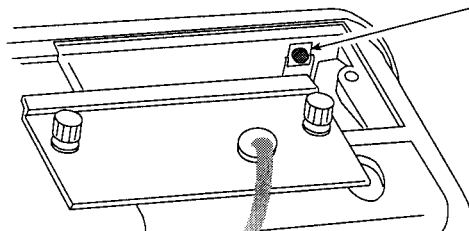


Type L

Battery Case



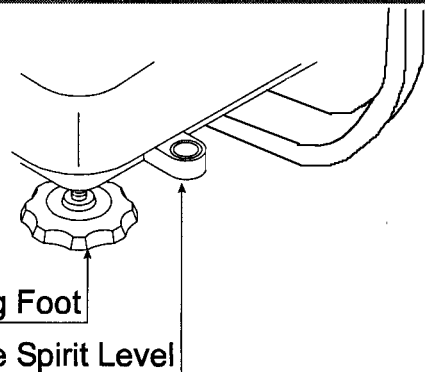
CAL switch
Calibrating the scale to weigh correctly.



Caution
It is necessary to use a certified mass.

Leveling Foot




Bubble Spirit Level

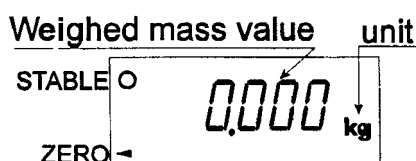




6.1 Display and Symbols

Display and Symbols

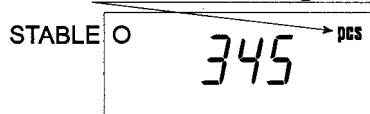
STABLE 	Stability mark. When the current weight value is not changing, this mark is displayed. The reading may now be taken.
NET ZERO 	Zero point mark. With nothing on the pan and pressing the ZERO switch, this mark is displayed. The zero point is the starting point to weighing.
NET ZERO 	Net mark. After pressing the TARE switch this mark is displayed to show net weight is displayed
▼ PT or PT	Preset tare mark. When storing a tare with digital input this mark blinks.
▼ M+ or M+	Accumulation mark. When using the accumulation function, this mark is displayed.
BATT	Low battery mark for type L. When the battery power is low this mark is displayed. Replace with six new batteries.
▼ READY or READY	Ready mark for the full/dribble batch function. This mark shows: ON The weighing value is within the zero-band. OFF The full/dribble batch process is above the zero-band. Blinking The start or end of the full/dribble batch process above the zero-band.
ex. HV-15KGV ▼ 15kg ▼ 6kg ▼ 3kg	The weighing range indicator. The current range is indicated.
○ HI ○ OK ○ LO or HI OK LO	The comparator indicator. Using the comparator function and comparing a weighing value with the upper and lower limits, the result is indicated. Using the full/dribble batch function, the full flow gate indicator is shown as OK, the dribble flow gate indicator as HI and the zero band indicator as LO.



Example:- Display of zero (zero point).
With an empty weighing pan by pressing the **ZERO** switch:-
- The Zero mark is displayed.
- The stability mark is displayed.

Display and Symbols

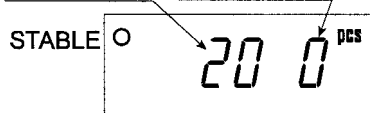
Unit of counting mode



Example:- Display of the counting mode.

This mode uses the registered unit mass, counts the amount of articles on the pan. The unit is PCS.

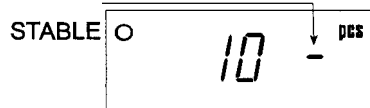
20 pieces Zero point



Example:- Storing the unit mass in the counting mode.

This is a display of zero point for counting mode and uses 20 pieces for the unit mass registration.

No zero value



Example:- Storing the unit mass in the counting mode.

Sign “-” means “weighing value is not zero”.

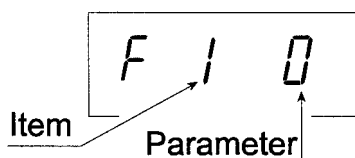
Sample number is 10 pieces.



Unit of percentage

Example:- Percentage mode.

This mode uses the registered 100% mass, converts the weighing value to a percentage. The unit is % .



Example:- Display of the function table.

This function table sets parameters of items.

switch

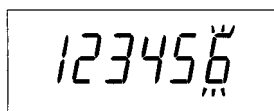
Selecting an item.

switch

Selecting a parameter of the item.

switch

Storing new parameters.



Example:- Preset tare. Entering tare with digital input.

switch

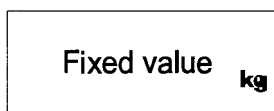
Selecting a figure.

switch

Selecting a number.

switch

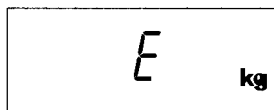
Storing new tare.



Example:- Hold display

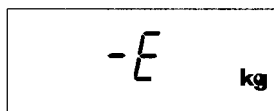
The hold display is set using *F 12* of the function table.

When weighing value is “near-zero” or changes more than 25% +30 digits, the hold is cancelled.



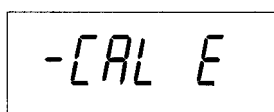
Overload display.

Remove everything from the pan.



Weighing error.

Check the base unit and weighing pan.

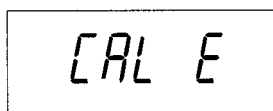


Calibration error.

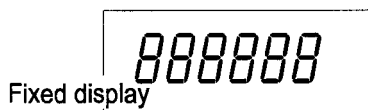
Means “Calibration mass is too light”.

Check the base unit and weighing pan.

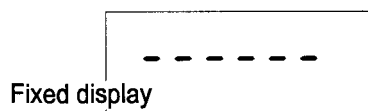
Display and Symbols



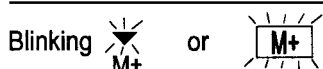
Calibration error.
Means "Calibration mass is too heavy".
Check the base unit and weighing pan.



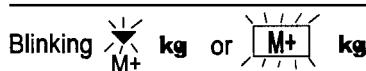
Weighed value is unstable due to drift, vibration etc. when turning on the scale.
Check around the weighing pan.
Check the connection of load cell cable.



Remove everything from the weighing pan.
Check around weighing pan.
Perform zero point calibration of the scale.



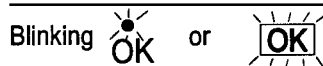
Accumulated data count



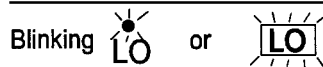
Total mass value of the accumulated data.



Comparator function = display is an upper limit.
Full/dribble batch function = display is a final value.



Full/dribble batch function = display is a preliminary value.

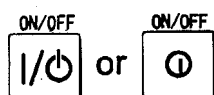


Comparator function = display is a lower limit.
Full/dribble batch function = display is the zero band.

CAP. MAX. 3/6/15kg d=1/2/5g
Description of the weighing unit, weighing range and minimum graduation.



6.2 Switches



Power switch.
Note Type V is in standby status when power is connected, even though the display is off.



Zero switch.
When there is nothing on the pan and the **ZERO** switch is pressed, the scale displays zero and the zero point mark.
Any stored tare is cancelled.



Tare switch.
Used to store the weight of a container when carrying out net weighing.



Range switch.
For changing the weighing range. (Refer to F_2)
Storing the unit mass, it is used to select a sample number.
In the function table, it is used to select a parameter.

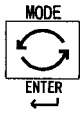
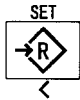
Set switch.

Can be used to turn the comparator on/off. (Refer to *F 5*)

Counting mode, it is used to enter the mode to store the unit mass.
Percentage mode, it is used to enter the mode to store the 100% mass.

In the full/dribble batch function, it is used as a start switch.

In the preset tare, and selecting calibration mass, it is used to select a figure.



Mode switch.

Used to change the current unit.

While setting modes, this switch is used for “storing a parameter and proceeding the next step”.



F switch

Full/dribble batch function, it is used to finish the process. (Refer to *F 10*)

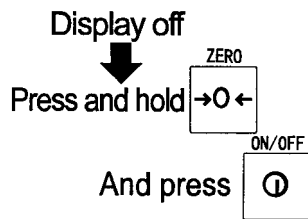
Hold switch. (Refer to *F 12*)

Setting a preset tare, selects polarity (+,-).

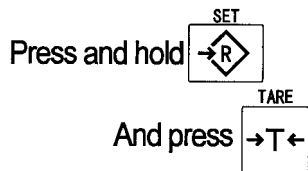


Print switch.

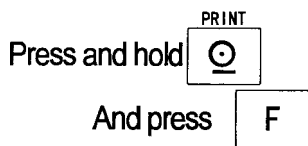
Used to print or output data. (Refer to *F 5, F 9*)



Used to enter the function table



Used to enter the mode to set a preset tare



Used to perform paper feed for the optional printer for type V.



7 Basic Operation



7.1 Turning the Scale On/Off & Basic Weighing

7.1.1 Type V or Type L with AC adaptor

- Step 1 Connect the scale to a ground point.
- Step 2 Ensure that the pan is empty.
- Step 3 Confirm that local voltage and receptacle type fit your scale.
- Step 4 The scale turns on/off using the **ON/OFF** switch alternately.
- Step 5 Check the accuracy of weighing. If you calibrate the scale, perform it after allowing the scale to warm up for 30 minutes.
- Step 6 Press the **ZERO** switch to display zero. (With nothing on the pan.)
- Step 7 Place something on the pan gently.
- Step 8 You can read the weight after the stability mark is displayed.
- Step 9 Remove the item from the pan.
- Step 10 Turn the scale off using the **ON/OFF** switch.

Memo

With the power cord connected, type V consumes only sufficient power for standby status after turning off the scale.

With the AC adaptor connected, type L consumes only the power of the AC adaptor after turning off the scale.

7.1.2 Type L with Batteries

- Step 1 Install six new batteries. Refer to “5.1. Installing the batteries for Type L”.
- Step 2 Ensure that the pan is empty.
- Step 3 The scale turns on/off using the **ON/OFF** switch alternately.
- Step 4 Check the accuracy of weighing. If you calibrate the scale, perform it after warming up the scale for 30 minutes.
- Step 5 Press the **ZERO** switch to display zero. (With nothing on the pan.)
- Step 6 Place something on the pan gently.
- Step 7 You can read the weight value after the stability mark is displayed.
- Step 8 Remove the item from the pan.
- Step 9 Turn the scale off using the **ON/OFF** switch.

Caution

Replace used dry cells with six new ones when **BATT is displayed.**

Battery life is affected by the environmental temperature.

Remove batteries from the display unit when the scale is not to be used for a long time. The batteries may leak and cause damage.



7.2 Tare (and Net Display)

The “Tare” is used to cancel the mass of a container, receptacle, case, bag, etc. which is put on the pan to contain the item to be weighed.

Caution

The tare reduces the available weighing range.

The current tare value is reset by pressing the ZERO switch or turning the scale off. (Reset value is zero.)

Storable preset tare value is within minimum weighing range for the HV-G series.

7.2.1 Semi-Automatic Tare (Input by Weighing)

Step 1 Put the container onto the pan.

Step 2 Press the **TARE** switch. The display becomes zero and the net mark is displayed.

Step 3 It is now possible to put something into the container and to read its net display.

Step 4 Remove all items from the pan.

7.2.2 Preset Tare (Digital Input of Known Tare)

Step 1 Press and hold the **SET** switch and press the **TARE** switch. Then the blank or stored tare value is displayed. This blank display means that the tare value is zero (reset value), and **PT** or **PT** blinks.

Step 2 Set the preset tare value by using the following switches.

▲ switch selecting the value of the figure.

◀ switch selecting a figure.

Note: The maximum Preset Tare is equal to the low range maximum capacity.

Step 3 Press the **ENTER** switch to store the new preset tare value. The scale displays a net value i.e. the tare value subtracted from the gross weight value.

Step 3 It is now possible to put something into the container and to read its net weight.

Step 4 Remove all items from the pan.



7.3 Weighing Range

This is the function to select a weighing range.
The mass value is displayed within a selected range.

There is the automatic range (F2 0) and manual range (F2 1) using the **RANGE** switch.

Operation and Performance

Function Table	Meaning and purpose
F2 0	<p>Automatic range</p> <p>Weighing range changes automatically as items are placed onto the pan.</p> <p>When there is nothing on the pan and the zero point mark is displayed, the scale changes back to the minimum range automatically</p> <p>Press the ZERO switch to change to minimum range, when there is nothing on the pan and the zero point mark is not displayed due to net display or zero offset</p>
F2 1	<p>Manual range</p> <p>Press the RANGE switch to expand the range.</p> <p>Press the RANGE switch to change to minimum range, when there is nothing on the pan and the zero point mark is displayed</p> <p>Press the ZERO switch and then the RANGE switch to change to minimum range, when there is nothing on the pan and the zero point mark is not displayed due to net display or zero offset</p>

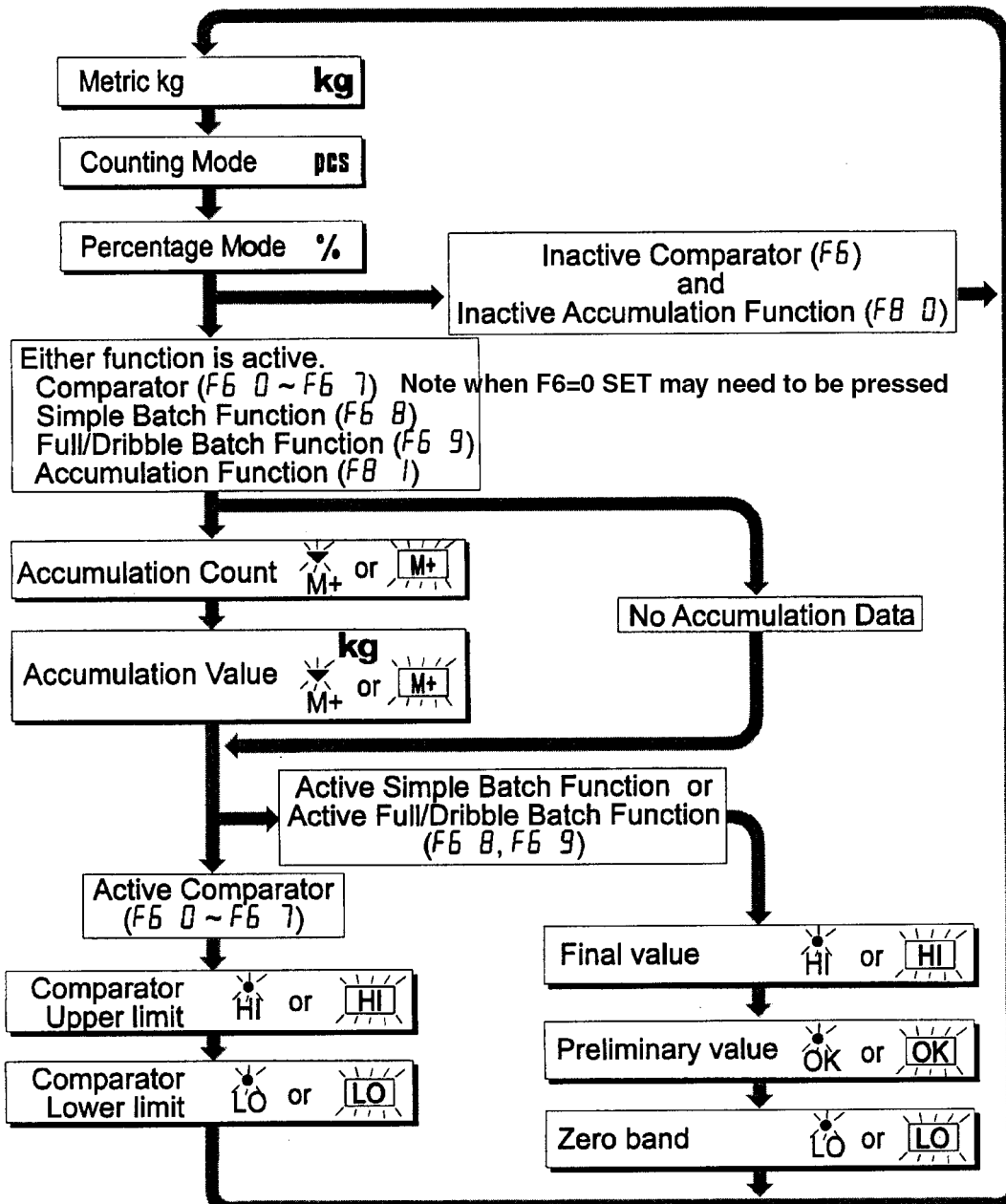
Weighing Range

Products	Weighing Range
HV-15KGV, HV-15KGL	3kg, 6kg, 15kg
HV-60KGV, HV-60KGL	15kg, 30kg, 60kg
HV-200KGV, HV-200KGL	60kg, 150kg, 220kg



7.4 Mode Switch (Changing Unit & Mode)

Pressing the MODE switch the display changes as shown below. Refer to the function table F3 for available units. Useable units are according to the factory settings.





8 Counting Mode

In counting mode the total weight of articles is converted to a count and assumes all articles have the same mass value.

It is necessary to store a unit mass to count articles.



8.1 Storing a Unit Mass

- Step 1 Press the **MODE** switch to display the unit **PCS**.
- Step 2 Press the **SET** switch to enter the mode to store a unit mass.
- Step 3 Press the **↕** switch to select the number of samples. The greater the quantity of samples, the greater the accuracy of the count.
5 pieces, 10 pieces, 20 pieces, 50 pieces, 100 pieces
- Step 4 Put the container onto the pan.
When the stability mark is displayed press the **TARE** switch.
- Step 5 Put in the number of samples selected at step 3.
Press the **ENTER** switch to store the weight after the stability mark is displayed. The count is then displayed.

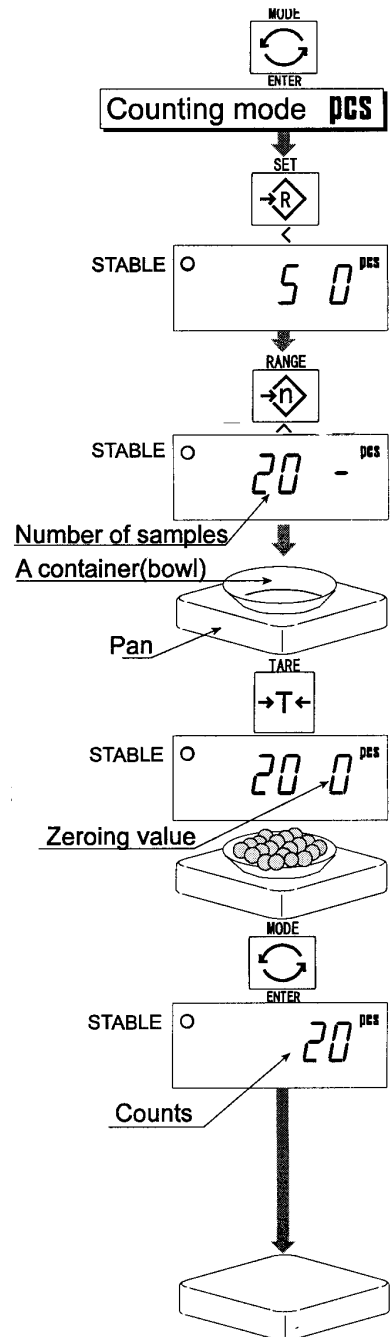
Caution

When the sample is too light and it is not possible to calculate a unit mass, the scale displays **Lo ut** and returns to step 3. It is necessary to increase the number of samples.

Pressing the **ENTER** switch after the **Lo ut** is displayed, the next weighing mode is displayed.

When the unit mass is too light to store, the scale displays **Lo ut**.

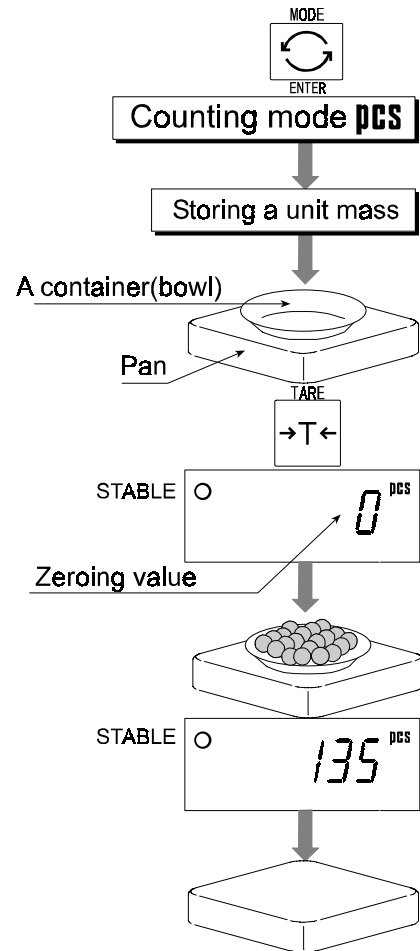
- Step 6 Remove all items from the pan.





8.2 Counting the number of articles

- Step 1 Press the **MODE** switch to display the unit **PCS**
- Step 2 Store the unit mass of the item.
Refer to “8.1 Storing a Unit Mass”
- Step 3 Put the container only onto the pan.
Press the **TARE** switch.
- Step 5 Put articles into the container and read the count.
- Step 6 Remove all items from the pan.



9 Percentage Mode

The percent mode is to display a mass value in the unit of “%”.

It is necessary to store a 100% mass value, in advance to use this function.

9.1 Storing a 100% Mass

Step 1 Press the **MODE** switch to display the unit %.

Step 2 Press the **SET** switch to enter the mode that stores a 100% mass.

Step 3 With nothing on the pan press the **ZERO** switch to display zero.

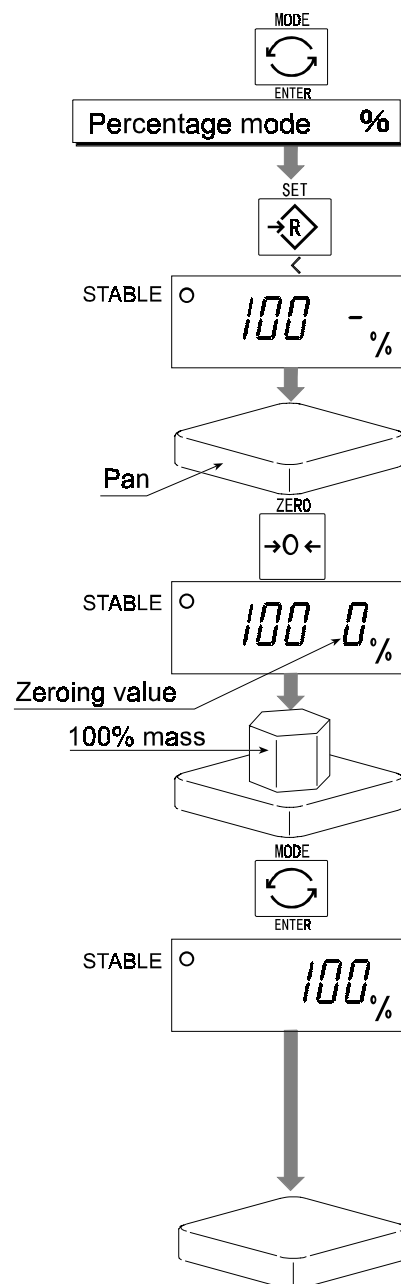
Step 4 Put the 100% mass on the pan gently. Press the **ENTER** switch to store it after the stability mark is displayed. Then the percentage unit is displayed.

Caution

When the sample is too light and it is not possible to calculate a 100% mass, the scale displays **Lo.** and returns to step 3.

Pressing the **ENTER** switch after **Lo** is displayed, the next weighing mode is displayed.

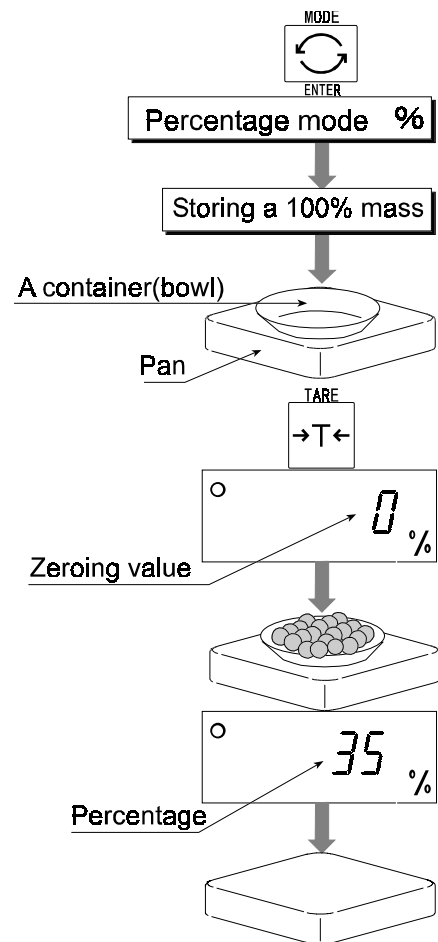
Step 5 Remove all items from the pan.





9.2 Reading Percentage

- Step 1 Press the **MODE** switch to display the unit %.
- Step 2 Store the unit mass of the article.
Refer to “9.1 Storing a 100% Mass “
- Step 3 If a container is needed, put the container only onto the pan and press the **TARE** switch.
- Step 4 It is now possible to put the item into the container and read the percentage.
- Step 5 Remove all items from the pan.





10 Accumulation Function

This function counts the number of weighed items, calculates the total mass value and can display the number and accumulated mass value.

It is necessary to set the parameters of the “accumulation function (*FB*)” in the function table in advance to use this function.

It is necessary to set the parameters of the “print mode (*FG*)” in the function table in advance to use the optional built-in printer.

Operation and Switches

The display of the accumulation count has a blinking ∇_{M+} or M^+ without a unit

The display of the accumulation value has a unit and a blinking ∇_{M+} or M^+

Pressing the **MODE** switch, the accumulation count and accumulation value is displayed.

Pressing the **ZERO** switch in the accumulation function (while a blinking ∇_{M+} or M^+) resets the current function. (The count and accumulated value become zero.)

When the optional built-in printer is installed and the **PRINT** switch is pressed, the accumulation data, date and data number are printed. Date is set at function table *FI 6* .

Caution

The accumulation function can only be used with the first weighing unit accumulated.

Parameter List and Word Definition

The “near-zero” is within ± 4 digits from the zero point in the unit of kg.

The “digit” a unit of display, is equivalent to the minimum graduation.

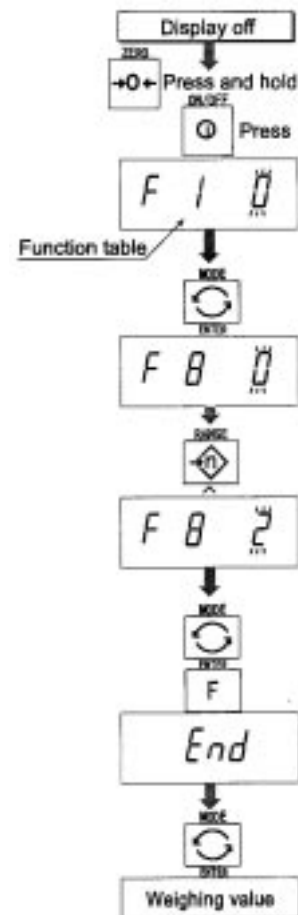
The “zero point” is the fundamental starting point to weighing.

Function table	Meaning & Purpose
<i>FB 0</i>	Accumulation function is not used.
<i>FB 1</i>	The scale accumulates the data, if the F switch is pressed when the display is a positive stable value above near-zero. The next accumulation can be performed after the display returns to near-zero or to a negative value.
<i>FB 2</i>	The scale accumulates the data, if the F switch is pressed, when the display is a stable value and outside near-zero. The next accumulation can be performed after the display returns to near-zero.
<i>FB 3</i>	When the display is a positive stable value, the scale accumulates the data automatically. The next accumulation can be performed after the display returns to near-zero or to a negative value.

Function table	Meaning & Purpose
FB 4	When the display is a stable value, the scale accumulates the data automatically. The next accumulation can be performed after the display returns to near-zero. Used for recording the number and mass of articles removed from the pan. (Put the articles on the pan. Press the TARE switch at each removal.)
FB 5	At each finish of the full/dribble batch function, the scale accumulates the data automatically. Used for packaging articles like a powder, it is used for recording the bag number and total mass.

10.1 Preparation (Setting Parameters)

- Step 1 Turn off the display.
Press the **ON/OFF** switch while the **ZERO** switch is pressed and held. The function table is displayed.
- Step 2 Press the **ENTER** switch to display an item of the accumulation function (*FB*).
- Step 3 Select a parameter of the accumulation function (*FB 1* ~ *FB 4*) with the **▲** switch.
- Step 4 Press the **ENTER** switch to store the new parameter.
Press the **F** switch and the **ENTER** switch to exit from the function table. Then the scale displays the weighing mode.





10.2 Operation and Performance (Examples)

Example 1

Weighing each article, the scale makes the accumulation according to *FB 3*.

Step 1 If accumulation has previously been used press the **MODE** switch to display  or **M+**.


Step 2 Press the **ZERO** switch to reset the accumulation data.

Step 3 Return to the kg mode using the **MODE** switch.

Press the **ZERO** switch with nothing on the pan.

Step 4 Put an article on the pan. Wait for the stability mark to be displayed and the value to be blinking. Remove the article and press the **ZERO** switch.

Step 5 Weigh additional articles using step 4.


Step 6 Press the **MODE** switch to display the number of articles and total mass with  or **M+** displayed.

Example 2

This example accumulates the articles that were removed from the pan. The function parameter is set to *FB 4*.

Step 1 Enter into the kg mode using the **MODE** switch.


Put all articles on the pan and press the **TARE** switch.

Step 2 Press the **MODE** switch to display  or **M+**.

Step 3 Press the **ZERO** switch to reset the accumulation data.
Return to kg mode with the **MODE** switch.

Step 4 Remove an article from the pan. Wait for the stability mark to be displayed and the value to blink. Press the **TARE** switch.

Step 5 Weigh additional articles using step 4.

Step 6 Press the **MODE** switch to display the number of articles and total mass with  or **M+** displayed.



11 Comparator Function

This function compares a display value with the upper limit (HI) and the lower limit (LO) and displays these results.

It is necessary to set the “comparator function (F6 0 ~ F6 7)” parameters, upper limit value (HI) and lower limit value (LO) in the function table, in advance to use this function.

It is necessary to install option OP-03 or OP-04, if you use the relay output of the comparator.

Comparator Sign

Comparison results are displayed by indicators HI OK LO or HI OK LO

Comparison Condition

weighing value < lower limit value	LO is displayed and output.
lower limit value ≤ weighing value ≤ upper limit value	OK is displayed and output.
upper limit value < weighing value	HI is displayed and output.

Parameter List and Word Definition

The “near-zero” is within ±4 digits from the zero point in the unit of kg.
 The “digit” is a unit of display, and is equivalent to the minimum graduation.
 The “zero point” is the fundamental starting point to weighing.

Function table	Meaning and Purpose
F6 0	The scale always compares the current display value. Pressing the SET switch turns the comparator on and off
F6 1	The scale always compares the display value.
F6 2	The scale always compares the display value if not near-zero. Pressing the SET switch turns the comparator on and off
F6 3	The scale always compares the display value if not near-zero.
F6 4	When the display value becomes stable the scale compares the display value. Pressing the SET switch turns the comparator on and off.
F6 5	When the display value is stable the scale compares the display value. It does not compare on an unstable condition.
F6 6	When the display value becomes stable, while not near-zero, the scale compares the display value. It does not compare on an unstable condition. Pressing the SET switch turns the comparator on and off.
F6 7	When the display value becomes stable and not near-zero, the scale compares the value.

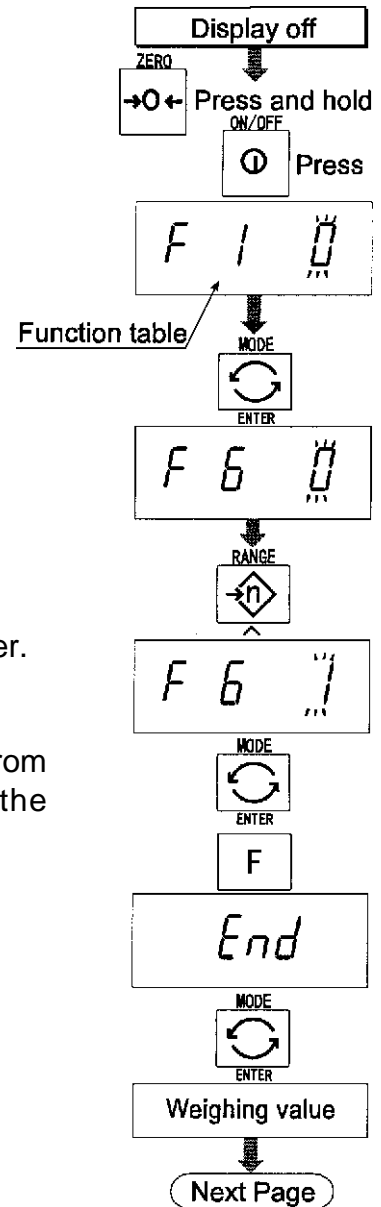
Caution

The upper limit value (HI) must be greater than the lower limit value (LO).
The parameters of the upper limit value (HI) and the final value (HI) use the same memory.
The parameters of the lower limit value (LO) and the zero band (LO) use the same memory.
The upper/lower comparator function, the simple batch function and the full/dribble batch function cannot be used at the same time because these parameters use common memory.



11.1 Preparation (Setting Parameters)

- Step 1 Turn off the display.
Press the **ON/OFF** switch while the **ZERO** switch is pressed and held. The function table is displayed.
- Step 2 Press the **ENTER** switch to display an item of the accumulation function (*F6*).
- Step 3 Select a parameter of the comparator function (*F6 0 ~ F6 7*) with the **▲** switch.
- Step 4 Press the **ENTER** switch to store the new parameter.
- Step 5 Press the **F** switch and the **ENTER** switch to exit from the function table. Then the scale displays the weighing mode.



Step 6 If one of **F6 0** , **F6 2** , **F6 4** , **F6 6** has been selected, press the **SET** switch to use the comparator.

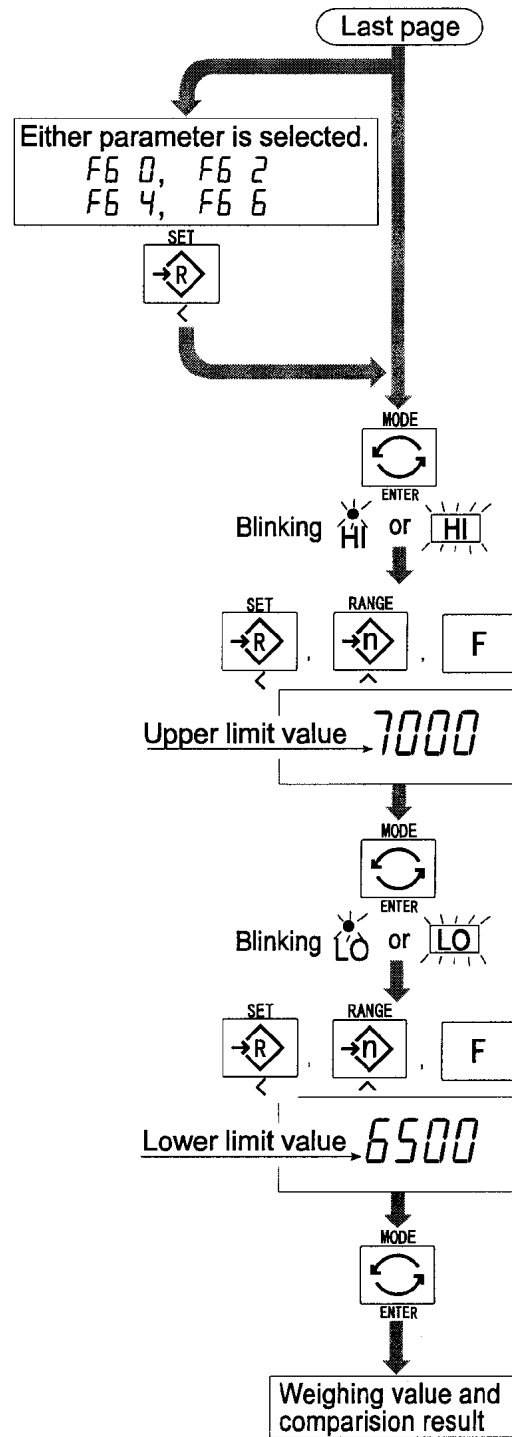
Step 7 Press the **MODE** switch to display the blinking HI.

Step 8 Set the upper limit value by using the following switches.
^ switch Selecting the value of a digit.
< switch Selecting a digit.
F switch Selecting the polarity (+,-).

Step 9 Press the **ENTER** switch to store the new parameter and display the blinking LO.

Step 10 Set the lower limit value by using the following switches.
^ switch Selecting the value of a digit.
< switch Selecting a digit.
F switch Selecting the polarity (+,-).

Step 11 Press the **ENTER** switch to store the new parameters and display the weighing mode.





11.2 Operation and Performance (Examples)

Example 1

This example is set as follows:

Function table	<i>F6 3</i>	(If the current display value is not near-zero, the scale compares the display value with the upper limit value and the lower limit value immediately.)
Upper limit value (HI)	7.000kg	
Lower limit value (LO)	6.500kg	

Case

The comparison starts at turning the scale on.

When the current value is less than 6.500kg, LO is displayed.

When the current value is between 6.500kg and 7.000kg, OK is displayed.

When the current value is greater than 7.000kg, HI is displayed.

Example 2

This example is set as follows:

Function table	<i>F6 4</i>	(Pressing the SET switch, after the stability mark is displayed, the scale compares the current display value with the upper limit value and the lower limit value immediately.)
Upper limit value (HI)	2.000kg	
Lower limit value (LO)	-1.000kg	

Case

Pressing the **SET** switch, the comparison is performed after displaying the stability mark.

When the current value is less than -1.000kg, LO is displayed.

When the current value is between -1.000kg and 2.000kg, OK is displayed.

When the current value is greater than 2.000kg, HI is displayed.



12 Full/Dribble Batch Function

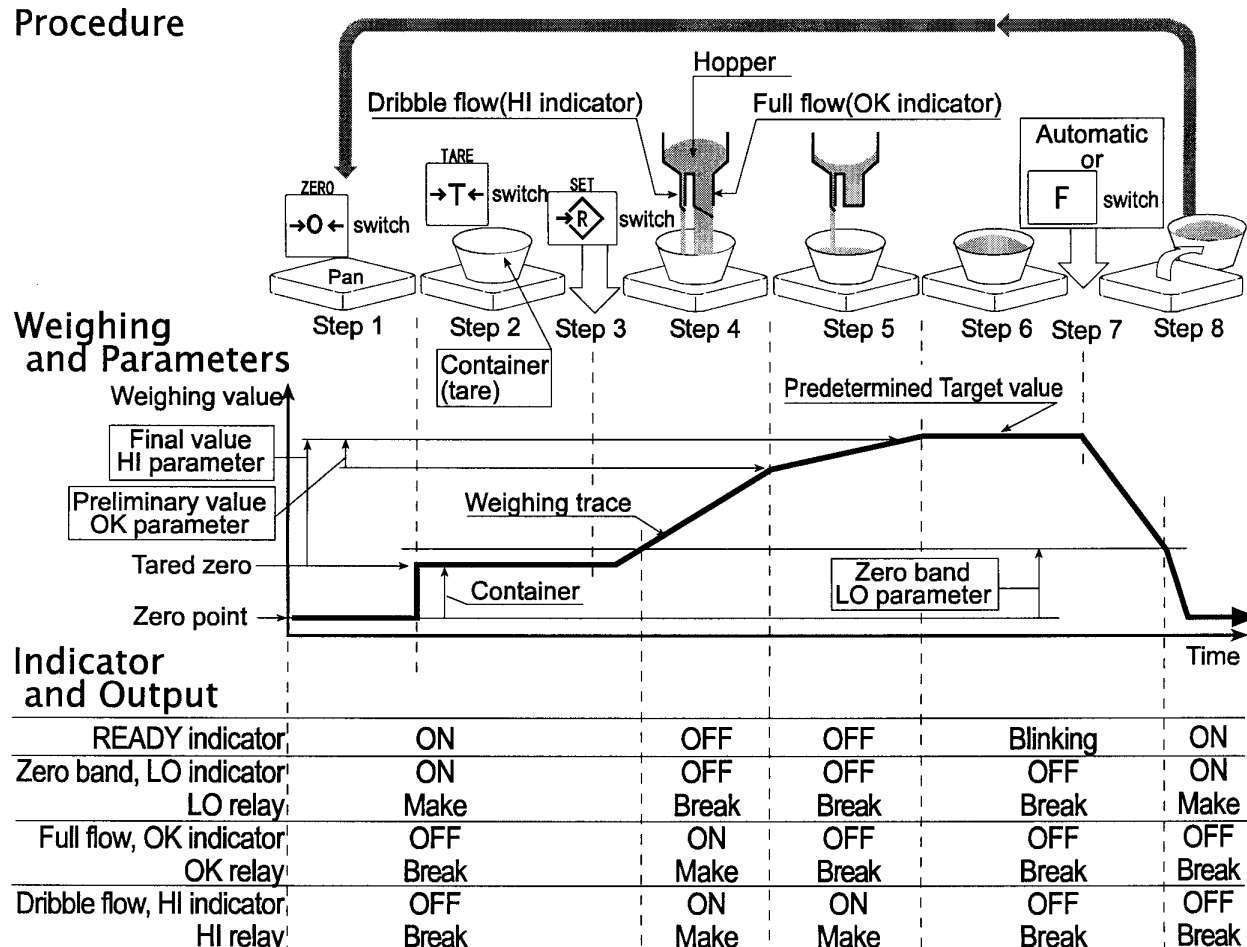
This function changes the scale to a filling machine which sub-divides a bulk product, e.g. grain, into loads of predetermined and virtually constant mass.

It is necessary to set the parameter of the “comparator function (F69)”, “full/dribble batch sub-function (F100 ~ F103)” in the function table, final value (HI), preliminary value (OK) and zero band (LO) in advance to use this function.

It is necessary to install option OP-03 or OP-04, to use the relay output of the full/dribble batch function.

In case of building up a filling machine with a scale and hopper, the performance and processing product of the system are assumed to be as follows:

Procedure



	Zero band indicator/ LO relay output	Preliminary value indicator/ OK relay output	Final value indicator/ HI relay output
Gross < Zero band (Zero detection Level)	ON / Make	OFF / Break	OFF / Break
Net < Final - Preliminary	OFF / Break	ON / Make	ON / Make
Final - Preliminary • Net • Final	OFF / Break	OFF / Break	ON / Make
Final ≤ Net	OFF / Break	OFF / Break	OFF / Break

Caution

The comparison of the full/dribble batch function is not reversible (One way sequence). If the display value becomes less than the final value after the value reached a predetermined target value, neither HI or LO is on.

The parameters of the upper limit value (HI) and the final value (HI) use the same memory. The parameters of the lower limit value (LO) and the zero band (LO) use the same memory.

The upper/lower comparator function, the simple batch function and the full/dribble batch function cannot be used at the same time because these parameters use common memory.

Set the zero band greater than the tare value.

Operation

Pressing the **SET** switch, the scale starts the batch process.

Selecting a parameter from $F 10 0$ or $F 10 2$ of the full/dribble batch sub-function, the **F** switch works as the finish switch.

Parameter List and Word Definition

The “gross” is a total weighing value, no tare value is subtracted.

The “net” is a measurement value with the tare value subtracted from the gross.

The “zero band” means the zero detection level.

The “zero point” is the fundamental starting point to weighing.

Comparator

Function table	Meaning and purpose
$F 6 9$	Full/Dribble batch function

Full/Dribble batch sub-function

Function table	Meaning and purpose
$F 10 0$	Reaching final value and pressing the F switch the current process is finished.
$F 10 1$	Reaching the final value and displaying the stability mark the current process is finished automatically.
$F 10 2$	Pressing the SET switch the scale automatically tares and starts the full/dribble batch process. Reaching final value and pressing the F switch, the current process is finished.
$F 10 3$	Pressing the SET switch the scale automatically tares and starts the full/dribble batch process. Reaching the final value and displaying the stability mark the current process is finished.

Hold

Function table	Meaning and purpose
$F 12 0$	The hold function is not used

12.1 Preparation (Setting Parameters)

Step 1 Turn off the display.
Press the **ON/OFF** switch while the **ZERO** switch is pressed and held. The function table is displayed.

Step 2 Press the **ENTER** switch to display an item of the comparator function (**F 1 0**).

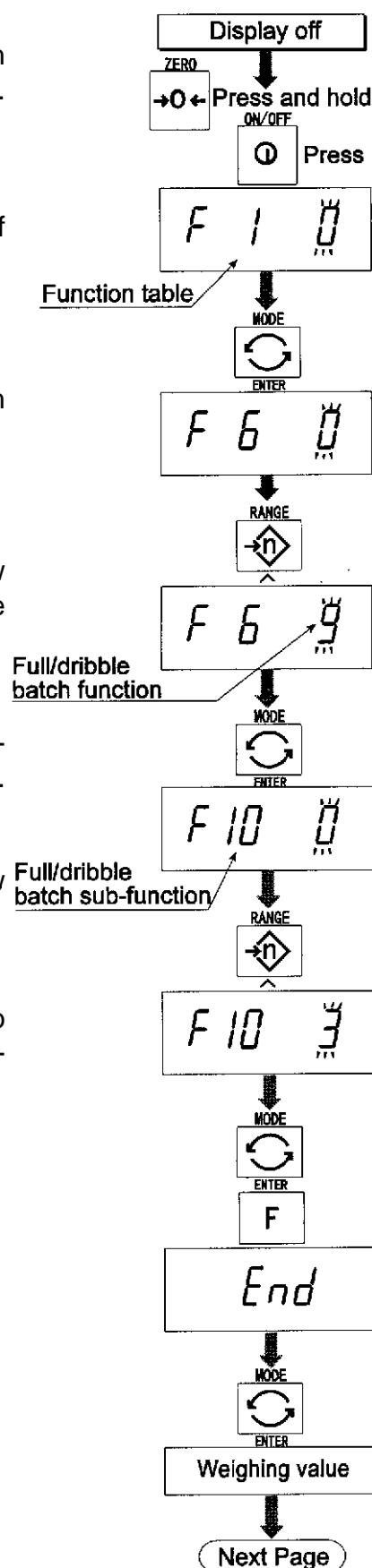
Step 3 Select a parameter of the full/dribble batch function (**F 6 9**) with the **^** switch.

Step 4 Press the **ENTER** switch to store the new parameter and display an item of the full/dribble batch sub-function (**F 10 0**).

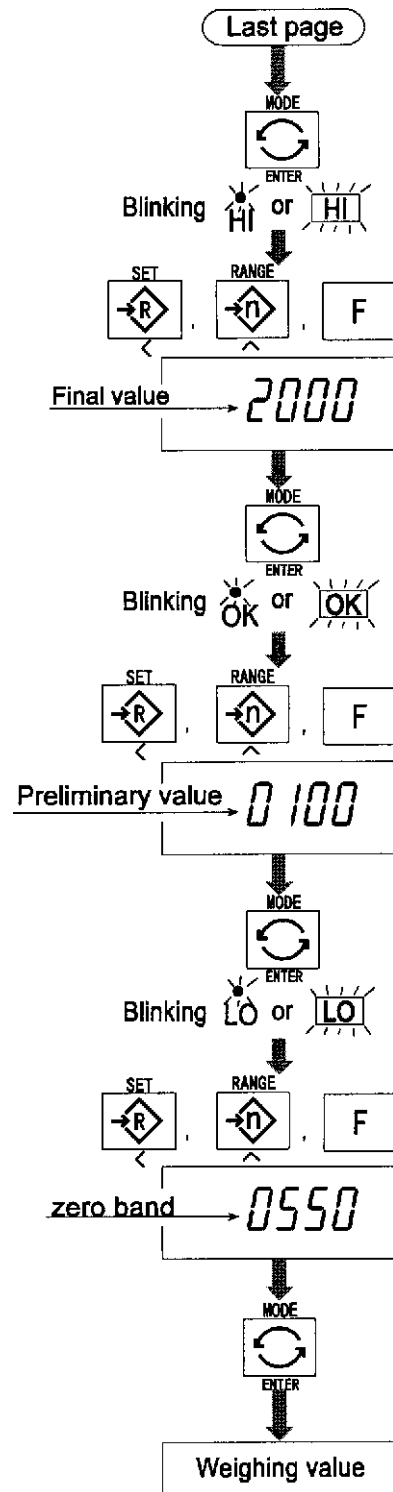
Step 5 Select a parameter of the full/dribble batch sub-function (**F 10 0 ~ F 10 3**) with the **^** switch.

Step 6 Press the **ENTER** switch to store the new parameter

Step 7 Press the **F** switch and the **ENTER** switch to exit from the function table. Then the scale displays the weighing mode.



- Step 8 Press the **MODE** switch to display the HI, flashing, (of the final value).
- Step 9 Set the final value using the following switches:-
▲ switch Selecting the value of a digit.
◀ switch Selecting a digit.
- Step 10 Press the **ENTER** switch to store the new parameter and display the blinking OK (of preliminary value).
- Step 11 Set the preliminary value using the following switches.
▲ switch Selecting the value of a digit.
◀ switch Selecting a digit.
- Step 12 Press the **ENTER** switch to store the new parameter and display the blinking LO (of zero band).
- Step 13 Set a zero band which is greater than the tare value, using the following switches.
▲ switch Selecting the value of a digit.
◀ switch Selecting a digit.
- Step 14 Press the **ENTER** switch to store the new parameter and display the weighing mode.





13 Simple Batch Function

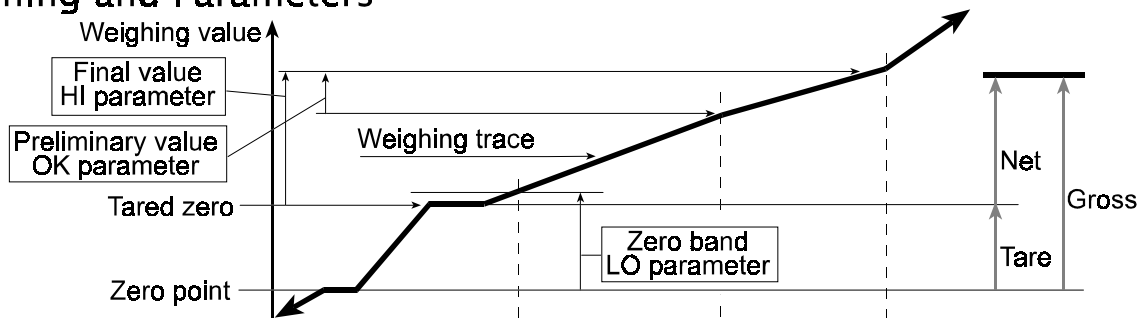
This function compares a display value with the final value, preliminary value and zero band for the full/dribble batch function. The result is indicated to zero band (LO indicator), full flow (HI indicator) and dribble flow (OK indicator). Even if a weighing value increases and decreases this function continues to compare.

It is necessary to set the parameters of the “simple batch function ($FG\ B$)” in the function table, final value (HI), preliminary value (OK) and zero band (LO) in advance to use this function.

It is necessary to install option OP-03 or OP-04, to use the relay output of the comparator.

It is necessary to install option OP-03, to use the buzzer output of the comparator.

Weighing and Parameters



Indicator and Output

Zero band, LO indicator	ON	OFF	OFF	OFF
LO relay output	Make	Break	Break	Break
Preliminary, OK indicator	OFF	OFF	ON	ON
OK relay output	Break	Break	Make	Make
Final, HI indicator	OFF	OFF	OFF	ON
HI relay output	Break	Break	Break	Make

Comparison Condition

Gross	<	Zero band LO is displayed and output.
Final - Preliminary	≤	Net OK is displayed and output.
Final	≤	Net OK, HI is displayed and output.

Parameter List and Word Definition

The “gross” is a total measurement value, no tare value is subtracted.

The “net” is a measurement value with a tare value subtracted from the gross.

The “tare” is an item put on the pan and its mass is subtracted from the gross.

The “zero band” means the zero detection level.

The “zero point” is the fundamental starting point to weighing.

Function Table	Meaning and purpose
$FG\ B$	Simple batch function

Caution

The parameters of the upper limit value (HI) and a final value (HI) use the same memory. The parameters of the lower limit value (LO) and the zero band (LO) use the same memory.

The upper/lower comparator function, the simple batch function and the full/dribble batch function cannot be used at the same time because these parameters use common memory.

13.1 Preparation (Setting Parameters)

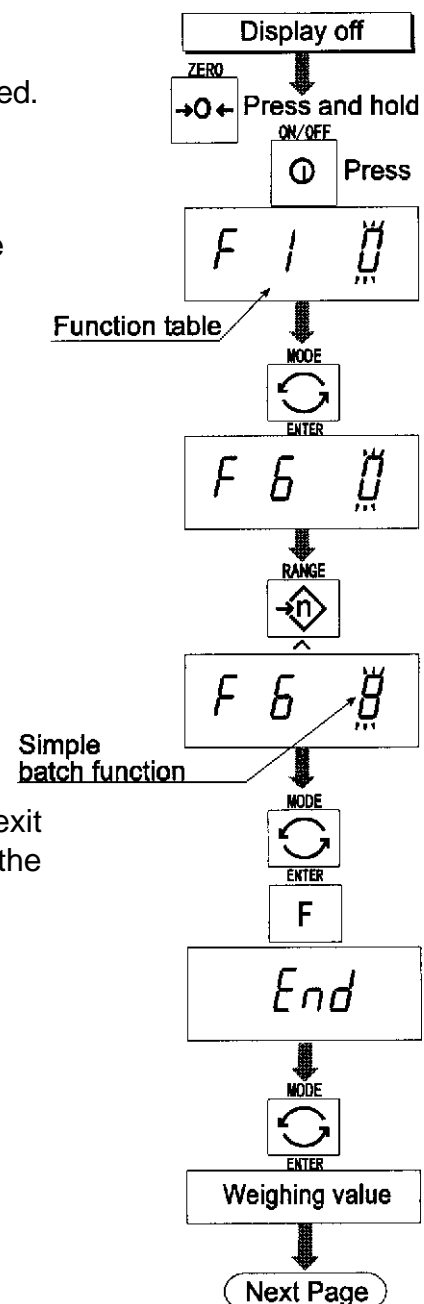
Step 1 Turn off the display.
Press the **ON/OFF** switch while the **ZERO** switch is pressed and held. The function table is displayed.

Step 2 Press the **ENTER** switch to display an item of the comparator function (**F5**).

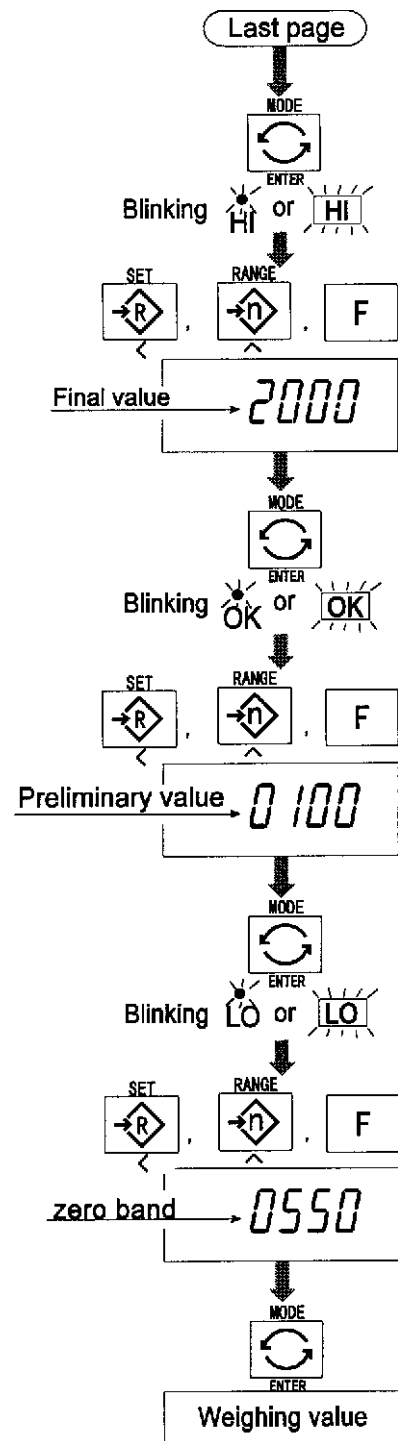
Step 3 Select a parameter of the simple batch function (**F6 B**) with the **▲** switch.

Step 4 Press the **ENTER** switch to store the new parameter.

Step 5 Press the **F** switch and the **ENTER** switch to exit from the function table. Then the scale displays the weighing mode.



- Step 6 Press the **MODE** switch to display the blinking HI (of the final value).
- Step 7 Set the final value using the following switches.
 switch Selecting the value of a digit.
 switch Selecting a digit.
- Step 8 Press the **ENTER** switch to store the new parameter and display the blinking OK (of preliminary value).
- Step 9 Set the preliminary value using the following switches.
 switch Selecting the value of a digit.
 switch Selecting a digit.
- Step 10 Press the **ENTER** switch to store the new parameter and display the blinking LO (of zero band).
- Step 11 Set the zero band using the following switches.
 switch Selecting the value of a digit
 switch Selecting a digit.
- Step 12 Press the **ENTER** switch to store the new parameter and display the weighing mode.



13.2 Operation and Performance (Examples)

- Step 1 Select the parameter *FB B* of the function table.
- Step 2 Set the parameters of the final value, preliminary value and zero band.
- Step 3 The comparison result is always displayed.



14 Calibration (Adjusting the Scale)

The scale is an instrument which weighs the “weight” and displays its “mass”. Calibration is the adjustment function so that the scale can weigh correctly.

There are three steps to calibration.

Gravity Acceleration CorrectionWhen a calibrated scale is moved to a distant place, the scale can correctly weigh by adjusting to a new local gravity acceleration.

Refer to the “gravity acceleration table” on the next page.

Calibration of the Zero Point When there is nothing on the pan, it is the function that performs adjustment so as to display the zero point mark .

Comment The zero point, is the fundamental starting point to weighing, and influences the performance of scale.

Span Calibration The function that adjusts the span with a calibrated mass so that the scale can accurately weigh anything within the weighing capacity.

Comment Span means the range of weighing capacity. Use a calibration mass at least two thirds of the weighing capacity.

Caution

It is necessary to calibrate the HV-G series using a mass of the OIML class M1 or equivalent.

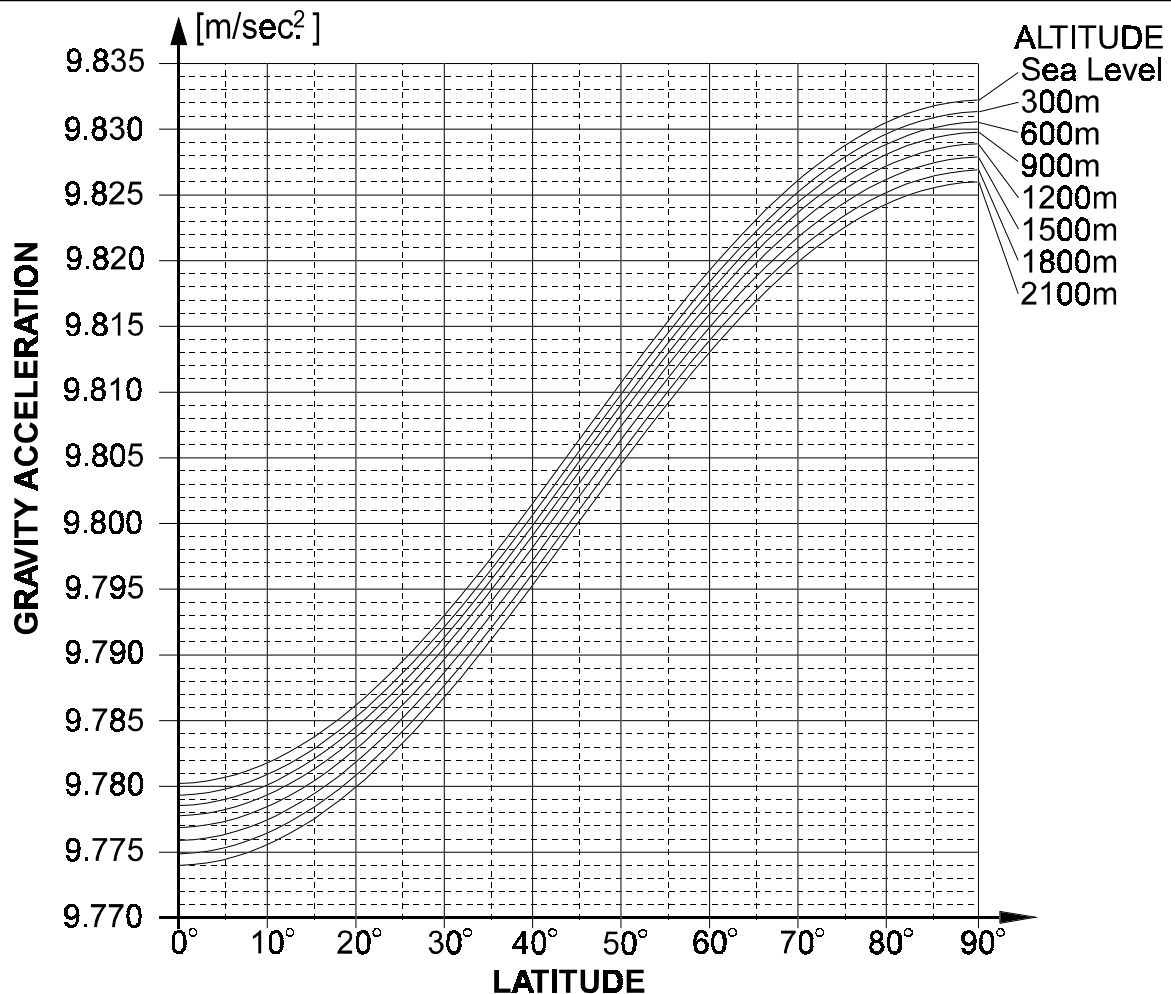
Periodically check the accuracy of weighing. Calibrate the scale, if it is moved to another location or the environment has changed.

It is not necessary to correct for the gravity acceleration, when calibrating your scale with the calibration mass at the place where your scale is used.



14.1 The Gravity Acceleration Table

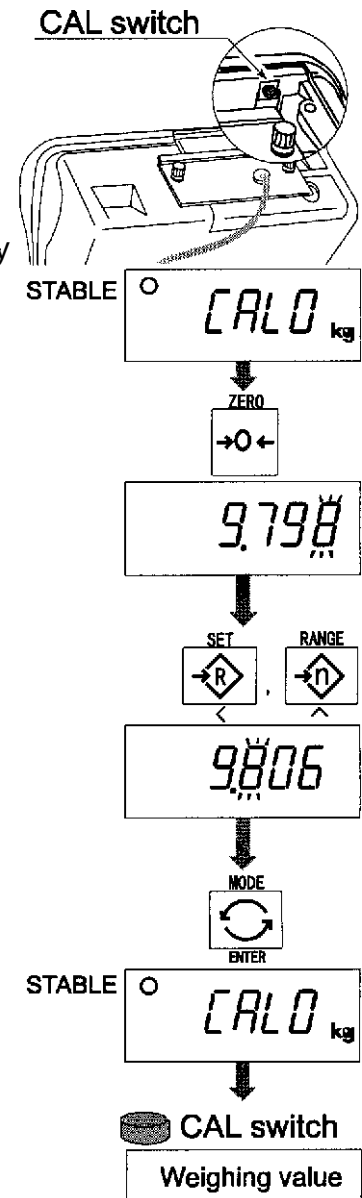
Amsterdam	9.813	m/s ²	Manila	9.784 m/s ²
Athens	9.800	m/s ²	Melbourne	9.800 m/s ²
Auckland NZ	9.799	m/s ²	Mexico	9.779 m/s ²
Bangkok	9.783	m/s ²	Milan	9.806 m/s ²
Birmingham	9.813	m/s ²	New York	9.802 m/s ²
Brussels	9.811	m/s ²	Oslo	9.819 m/s ²
Buenos Aires	9.797	m/s ²	Ottawa	9.806 m/s ²
Calcutta	9.788	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
Glasgow	9.816	m/s ²	Sydney	9.797 m/s ²
Havana	9.788	m/s ²	Taiwan	9.788 m/s ²
Helsinki	9.819	m/s ²	Taipei	9.790 m/s ²
Kuwait	9.793	m/s ²	Tokyo	9.798 m/s ²
Lisbon	9.801	m/s ²	Vancouver, BC	9.809 m/s ²
London (Greenwich)	9.812	m/s ²	Washington DC	9.801 m/s ²
Los Angeles	9.796	m/s ²	Wellington NZ	9.803 m/s ²
Madrid	9.800	m/s ²	Zurich	9.807 m/s ²



14.2 The Complete Calibration Procedure

14.2.1 Gravity Acceleration Correction

- Step1 Turn on the display.
Open the rear cover of the display unit.
Inside the display unit, press and hold the **CAL** switch to enter the calibration mode.
Then **CAL 0** is displayed.
- Step2 Press the **ZERO** switch to enter the gravity acceleration correction mode.
- Step3 Set your local gravity acceleration using the following switches.
▲ switch Selecting the value of a digit.
◀ switch Selecting a digit.
- Step4 Press the **ENTER** switch to store the new value.
- Step5 Press the **CAL** switch again. Then the scale returns to the normal weighing mode.



14.2.2 Preparation

- Step 6 Confirm the environmental conditions as follows:
Maintain a constant temperature and a stable power supply.
Install the scale on a solid floor or bench where there is no draft, vibration, strong magnetic fields or direct sunlight.
Consider section "4. Caution".
- Step 7 Display normal weighing for at least 30 minutes to warm up the scale.

14.2.3 Calibration of the Zero Point

Step 8 Press and hold the **[CAL]** switch to enter the calibration mode after displaying normal weighing for 30 minutes. Then the **[CAL 0]** is displayed.

Step 9 With nothing on the pan, press the **[ENTER]** switch while the stable mark is displayed. The scale stores the current condition as the zero point.

Step 10 The scale displays **[SPn]** for several seconds. If finishing the calibration mode at this stage (Zero calibration only), proceed to step 14.

14.2.4 Span Calibration

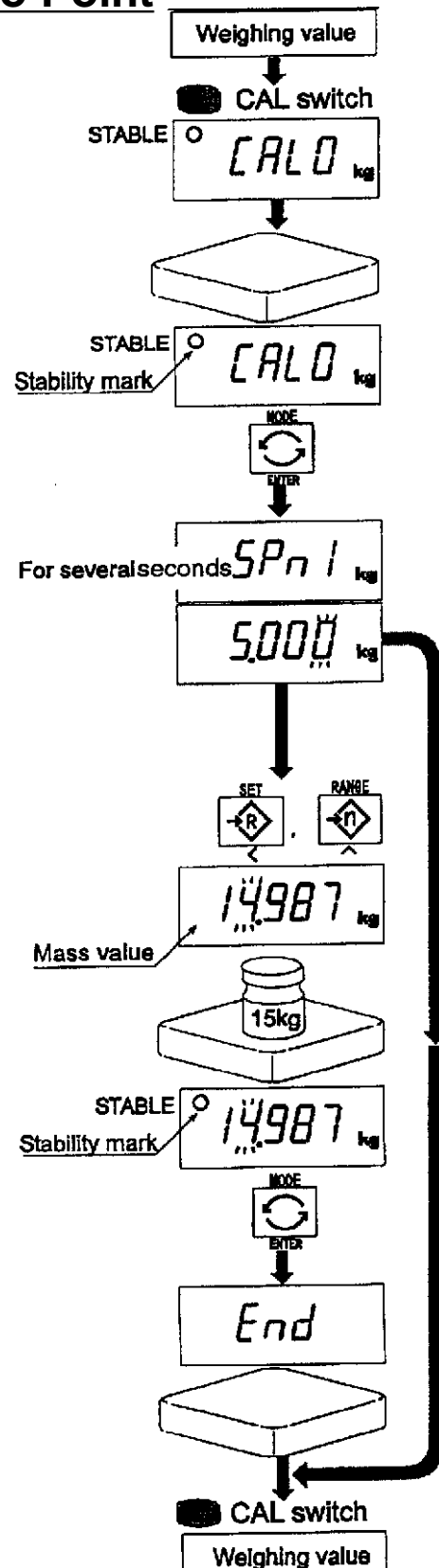
Step 11 Set the value of the calibration mass using the following switches. (This initial value is according to each product.)

- [^]** switch Selecting the value of a digit.
- [<]** switch Selecting a digit.

Step 12 Place the mass' selected at step 11' onto the pan and press the **[ENTER]** switch while the stable mark is displayed. The scale then calculates the span and stores it.

Step 13 The scale displays **[End]** at the finish. Remove the mass from the pan.

Step 14 Press the **[CAL]** switch to return to the normal weighing mode.

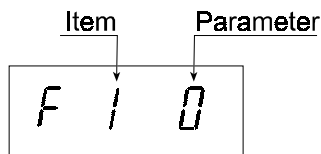




15 The Function Table

The function table is provided to store and reference items that determine the performance of the scale. Each item has a parameter.

The parameters are maintained even without power applied.



15.1 The Procedure for Setting Parameters

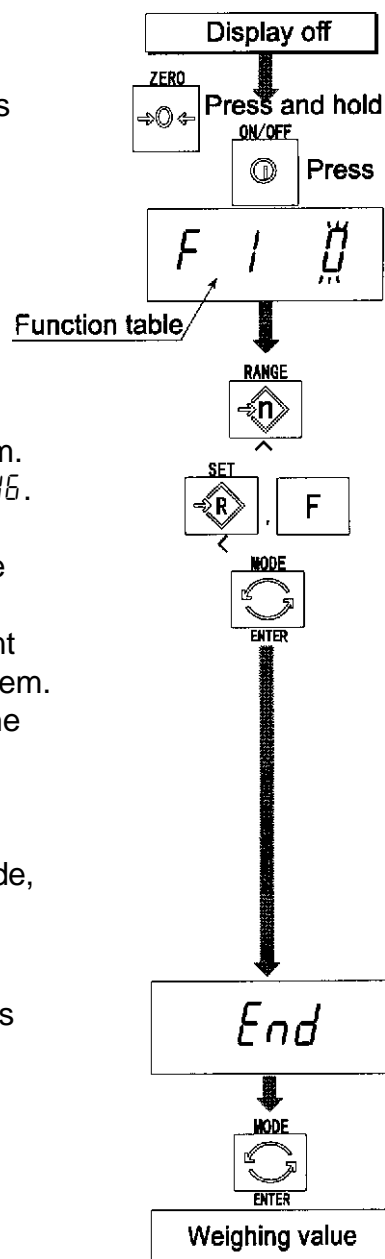
Step 1 Turn off the display.
Press the **ON/OFF** switch while the **ZERO** switch is pressed and held. The function table is displayed.

Step 2 Set parameters for each item using the following switches.

- ▲** switch Selecting the parameter of an item.
- ◀** switch Selecting the value of a digit at *F 1 0*.
- F** switch Proceeding to the end of the table without storing the parameter.
- ENTER** switch Storing a parameter for the current item and proceeding to the next item. Returning to normal mode from the end of the table.

Step 3 Press the **ENTER** switch to return to the normal mode, when *End* is displayed.

Note Pressing the **ENTER** switch on step 2, the parameter is stored in the scale.





15.2 Parameter List

Item	Display	Meaning and purpose
<i>The type L scale is turned off after 5 minutes of no operation, when displaying zero.</i>		
Automatic turning off	F1 0 #	Not used
	F1 1	Used
<i>Selects the method of changing the weighing range</i>		
Range	F2 0 #	Automatic range change.
	F2 1	Manual range change using the RANGE switch.
<i>Transmission rate of the serial interface (RS-232C/ 422/485).</i>		
Baud rate	F4 0 #	2400bps
	F4 1	4800bps
	F4 2	9600bps
<i>Mode selection for the serial interface (RS-232C/ 422/485).</i>		
Output mode	F5 0 #	Stream mode. (Refer to "16.2 Stream Mode")
	F5 1	Command mode. (Refer to "16.3 Command Mode")
	F5 2	A data is output, when the PRINT switch is pressed.
	F5 3	Auto-print +
		When the display becomes a positive stable value above near-zero, the scale outputs the data automatically. Next output can be performed after the display becomes near-zero or a negative value.
	F5 4	Auto-print +/-
	When the display becomes a stable value outside near-zero, the scale outputs the data automatically. Next output can be performed after the display becomes near-zero.	
F5 5	At each finish of full/dribble batch function, the data is output.	
Comparator	F6 0 #	The scale always compares the current display value. Pressing the SET switch turns the comparator on and off
	F6 1	The scale always compares the display value.
	F6 2	The scale always compares the display value if not near-zero. Pressing the SET switch turns the comparator on and off
	F6 3	The scale always compares the display value when not near-zero.

Notes

The “#” indicates factory settings.

The “near-zero” is within ± 4 digits from zero point in the unit of kg.

Item	Display	Meaning and purpose
Comparator	F6 4	When the display value becomes stable the scale compares the display value. Pressing the SET switch turns the comparator on and off.
	F6 5	When the display value becomes stable, the scale compares the display value. It does not compare on an unstable condition.
	F6 6	When the display value becomes stable, while not near-zero, the scale compares the display value. It does not compare on an unstable condition. Pressing the SET switch turns the comparator on and off.
	F6 7	When the display value becomes stable when not near-zero, the scale compares the value.
	F6 8	Simple batch function. (Refer to section 13.)
	F6 9	Full/dribble batch function. (Refer to section 12.)
Buzzer	<i>The condition of the buzzer on option OP-03 by comparator function or full/dribble batch function.</i>	
	F7 0 #	No buzzer.
	F7 1	The buzzer sounds at LO.
	F7 2	The buzzer sounds at OK.
	F7 3	The buzzer sounds at LO and OK.
	F7 4	The buzzer sounds at HI.
	F7 5	The buzzer sounds at LO and HI.
	F7 6	The buzzer sounds at OK and HI.
	F7 7	The buzzer sounds at LO, OK and HI.
	F7 8	The buzzer sounds at finishing the full/dribble batch process.
Accumulator	<i>The condition of the accumulator</i>	
	F8 0 #	Accumulator is not used.
	F8 1	The scale accumulates the data, if the F switch is pressed, when the display becomes a positive stable value above near-zero. Next accumulation can be performed after the display becomes near-zero or a negative value.
	F8 2	The scale accumulates the data, if the F switch is pressed, when the display becomes a stable value outside near-zero. Next accumulation can be performed after the display becomes near-zero.
	F8 3	When the display becomes a positive stable value, the scale accumulates the data automatically. Next accumulation can be performed after the display becomes near-zero or a negative value.

Item	Display	Meaning and purpose
Accumulation	F8 4	When the display becomes a stable value, the scale accumulates the data automatically. Next accumulation can perform after the display becomes near-zero. Use: Recording number and mass of articles removed from the pan. (Put articles on the pan. Press TARE switch at each removal.)
	F8 5	At each finish of full/dribble batch function, the scale accumulates the data automatically. Use: Packing articles like a powder, it is used for recording the bag number and total mass.
<i>The printing condition when using option OP-06 for type V.</i>		
Print Mode	F9 0 #	No print.
	F9 1	Pressing the PRINT switch, the data is output.
	F9 2	Auto-print + When the display becomes a positive stable value above near-zero, the scale outputs the data automatically. Next output can be performed after the display becomes near-zero or negative value.
	F9 3	Auto-print +/- When the display becomes a stable value outside near-zero, the scale outputs the data automatically. Next output can be performed after the display becomes near-zero.
	F9 4	At each finish of full/dribble batch function, the data is output.
	F9 5	When the accumulation function is used, the data is output.
<i>The details of the full/dribble batch function (F5 9)</i>		
Full/Dribble Batch sub-function	F10 0 #	Reaching final value and pressing the F switch, the current process is finished.
	F10 1	Reaching final value and displaying the stability mark, the current process is finished automatically.
	F10 2	Pressing the SET switch, the scale automatically tares and starts the full/dribble batch process. Reaching final value and pressing the F switch, the current process is finished.
	F10 3	Pressing the SET switch, the scale automatically tares and starts the full/dribble batch process. Reaching final value and displaying the stability mark, the current process is finished.
<i>Address for RS-422 / RS-485 for option OP-04</i>		
Address	F11 00 # to F11 99	Use This address can be set from 01 to 99. Allows a computer to control a scale with the assigned address. (RS-232C should be set to "00".)

Item	Display	Meaning and purpose
Hold		<i>The function to hold the current display value. When the value becomes near-zero and the weighing value changes more than 25% +30 digits, hold display is cancelled.</i>
	F 12 0 #	Not used
	F 12 1	The hold function is ON or OFF alternately by the <input type="checkbox"/> switch.
	F 12 2	Displaying the stability mark, the display is held.
Averaging		<i>Selection of readability and response by averaging the weighing value.</i>
	F 13 0 #	Normal weighing.
	F 13 1	Scale for a person's weight.
	F 13 2	Animal weighing.
Precision of unit mass		<i>Selects a storable minimum unit mass in the counting mode.</i>
	F 14 0 #	Stores a unit mass using the unit of a digit.
	F 14 1	Stores a unit mass in the unit of one eighth digit.
	F 14 2	Stores a unit mass, if the total of sample mass is heavier than 5 digits.
Data Format		<i>Refer to "16.1. Data Format".</i>
	F 15 0 #	Format 1. (A&D general format for scales, balances)
	F 15 1	Format 2. (Older HV-A/ HW-A format)
Date		<i>It is necessary to use option OP-06 for type V. Use Print out of date. Caution Date is not updated. Print out of the management number for the scale.</i>
	F 16 000000	No print out.
	other	The relation between printout and display is as follows: Display 990721 Printout 99/07/21



16 RS-232C Serial Data Interface

RS-232C interface has the following two modes.

Stream mode	Outputs data continuously and can be used for printing data.
Command mode	Controls the scale using commands from a computer.

It is necessary to set the parameters of the "Baud rate (F4)", "Output mode (F5)", "Format (F15)" in the function table in advance.

There are option cables as follows:

AX-KO557ARS-232C cable, D-sub 25 pin, 2m

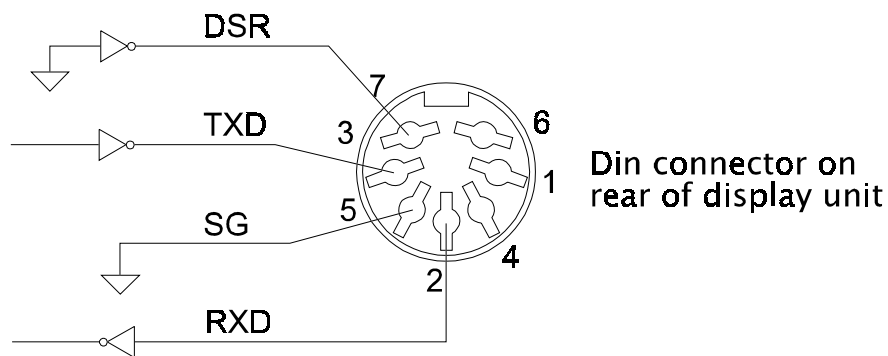
AX-KO1786-200 RS-232C cable, D-sub 9 pin, 2m

Transmission system	EIA RS-232C
Transmission	Asynchronous, bi-directional, half-duplex
Data format	Baud rate: 2400, 4800, 9600 bps
	Data: 7 bits
	Parity: 1 bit, Even
	Start bit 1 bit
	Stop bit 1 bit
	Code ASCII
	Terminator CR LF (CR: 0D[H], LF: 0A[H])

Pin Connections

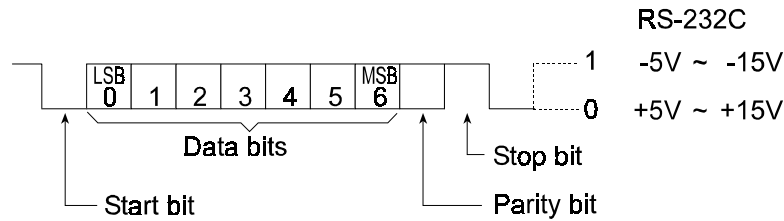
Pin No.	Signal name	Direction	Description
1	-		
2	RXD	Input	Receive data
3	TXD	Output	Transmit data
4	-		
5	SG -		Signal ground
6	-		
7	DSR	Output	Data set ready

Circuit



16.1 Data Format

Bit Format



Format 1

There are four headers for the type of data and weighing condition.

Stable weighing data ST Unstable weighing data US

Stable counting data QT Out of range (over) OL

The weighing data consists of 9 characters including decimal point and polarity.

The polarity is always output.

There are three units. The unit is 3 characters.

In case of "out of range", numbers become all 9's.

The terminator is always output as CR LF.

Data in the unit of kg ST,+00012.40_kgCRLF

Header Weighing value unit Terminator

Counting mode QT,+00003000_PCCRLF

Header Weighing value unit Terminator

Percentage mode ST,+000300.0__%CRLF

Header Weighing value unit Terminator

Out of range OL,+99999.99_kgCRLF

Header Polarity

Definition of symbols

CR (carriage return) CR LF (line feed) LF
0D[H] 0A[H]

Space _
20[H]

Format 2

There are four headers for the type of data and weighing condition.

Stable weighing data ST Unstable weighing data US

Stable counting data QT Out of range (over) OL

The weighing data consists of 7 characters including decimal point and polarity.

The data consists of 7 characters in the counting mode.

The polarity is always output.

There are three units. The unit is 2 characters.

In case of “out of range”, numbers become all 9’s.

The terminator is always output as CR LF.

Caution

When the data is longer than 7 characters in the counting or percentage mode, the overflow is ignored.

Data in the unit of kg ST, +002.40 kgCRLF
Header Weighing value unit Terminator

Counting mode QT, +003000 PCCRLF
Header Weighing value unit Terminator

Percentage mode ST, +0300.0 %CRLF
Header Weighing value unit Terminator

Out of range OL, +999.99 kgCRLF
Header ↑ Polarity

Definition of symbols

CR (carriage return) CR

LF (line feed) LF

0D[H]

0A[H]

Space

20[H]

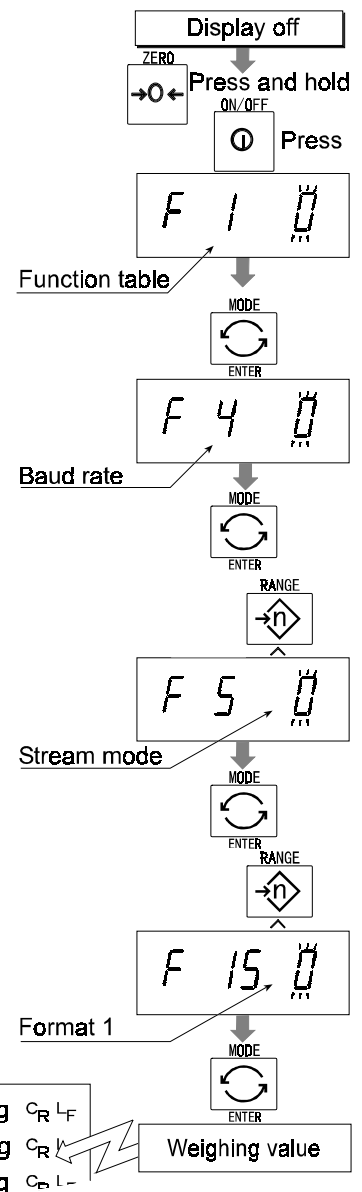
16.2 Stream Mode

The scale outputs the current display data at the same time as refreshing the display. The scale does not output data while in the setting mode.

Averaging function table	Refresh rate
F 13 0 Normal weighing	Approximately 7 times/s while the display is unstable. Approximately 4 times/s when the display is stable
F 13 1 A person's weight	Approximately 4 times/s
F 13 1 Animal weighing	Approximately 4 times/s

16.2.1 Preparation and Performance (Examples)

- Step 1 Turn off the display.
Press the **ON/OFF** switch while the **ZERO** switch is pressed and held. The function table is displayed.
- Step 2 Select a parameter for the "baud rate (F 4)" using the **ENTER** and **▲** switches.
- Step 3 Select "stream mode (F 5 0)" of "output" using the **ENTER** and **▲** switches.
- Step 4 Select "format 1 (F 15 0)" of "format" using the **ENTER** and **▲** switches.
- Step 5 Press the **ENTER** switch to store the new parameters. The scale returns to normal weighing and outputs the data continuously.





16.3 Command Mode

The command mode is the function which can perform “output data”, “controlling the scale” and “setting parameters” by a command transmitted from a computer.

Caution Allow at least 500 milliseconds between commands.

16.3.1 Command List

The following explanation uses “format 1 (F 15 0)”

Data output

The current weighing data is output.

Template Q

Command

Reply

Selection of mode and unit

Selects the mode and unit. This is the same as the switch.

Template U

Command

Response The scale changes mode and unit.

Zero

The current mass value is set to the zero point.

This is same as the ZERO switch.

Template Z

Command

Response The mass value becomes zero and zero point mark is displayed.

Tare

The current mass value is set to zero after placing a tare (container, receptacle, case, etc) and the net is displayed. This is same as the switch.

Template T

Command

Response The current mass value becomes zero and net mark is displayed.

Cancel of tare

The display value becomes the gross and the net mark is turned off. (The tare value becomes zero.)

Template CT

Command

Response Gross is displayed and the net mark is turned off.

Preset tare

Tare value is set and the net is displayed. The net mark is displayed.

Template PT, [parameter]
Command `P T , + 0 0 1 2 0 CR LF`
Response Net is displayed.

Upper limit value

An upper limit value is stored.

Template HI, [parameter]
Command `H I , + 0 1 2 0 0 CR LF`
Response The upper limit value is stored.

Lower limit value

A lower limit value is stored.

Template LO, [parameter]
Command `L O , - 0 0 4 0 0 CR LF`
Response The lower limit value is stored.

Caution The lower limit value must be less than the upper limit value.

Accumulation data output

Accumulated data is output.

Template A
Command `A CR LF`
Reply `A , + 0 2 3 1 2 . 4 0 _ k g CR LF`

Accumulation count output

Number of accumulations is output.

Template N
Command `N CR LF`
Reply `N , + 0 0 0 0 0 1 4 0 _ _ CR LF`

Reset of Accumulation data and number

Data and number of accumulations become zero

Template CA
Command `C A CR LF`
Response Data and number of accumulations become zero.

Final value

The final value is stored.

Template S0, [parameter]
Command

S	0	,	+	0	2	0	0	0	C _R	L _F
---	---	---	---	---	---	---	---	---	----------------	----------------

Response The value is stored.

Preliminary value

The preliminary value is stored.

Template S1, [parameter]
Command

S	1	,	+	0	0	2	0	0	C _R	L _F
---	---	---	---	---	---	---	---	---	----------------	----------------

Response The value is stored.

Zero band

The zero band is stored.

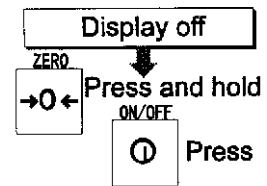
Template S2, [parameter]
Command

S	2	,	+	0	0	5	0	0	C _R	L _F
---	---	---	---	---	---	---	---	---	----------------	----------------

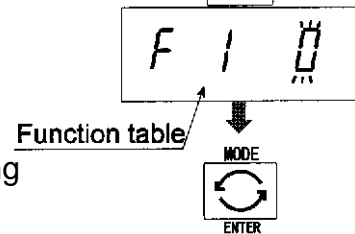
Response The value is stored.

16.4 Preparation (Setting Parameters)

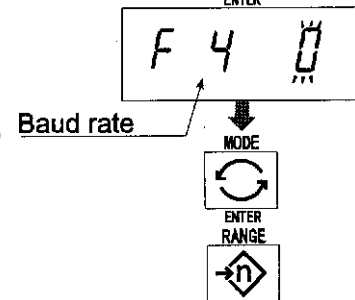
- Step 1 Turn off the display.
Press the **[ON/OFF]** switch while the **[ZERO]** switch is pressed and held. The function table is displayed.



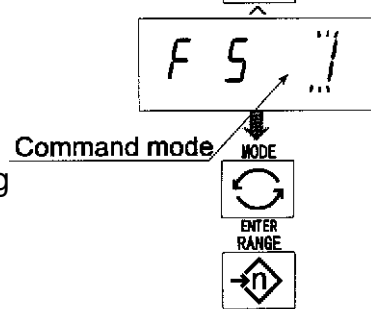
- Step 2 Select a parameter of the “baud rate (F4)” using the **[ENTER]** and **[^]** switches.



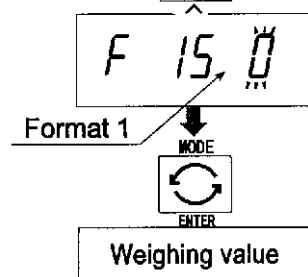
- Step 3 Select “command mode (F5 1)” of the “output” using the **[ENTER]** and **[^]** switches.



- Step 4 Select “format 1 (F15 0)” of the “format” using the **[ENTER]** and **[^]** switches.



- Step 5 Press the **[ENTER]** switch to store the new parameters.
Return to the normal weighing mode using the **[ENTER]** switch.



- Step 6 Receiving a command, the scale replies.



17 Options



17.1 RS-232C / Relay output / Buzzer (OP-03)

Replacing RS-232C interface with this option, refer to “RS-232C Serial Interface” for its specification.

The following option cables can be used, when you do not use the relay output.

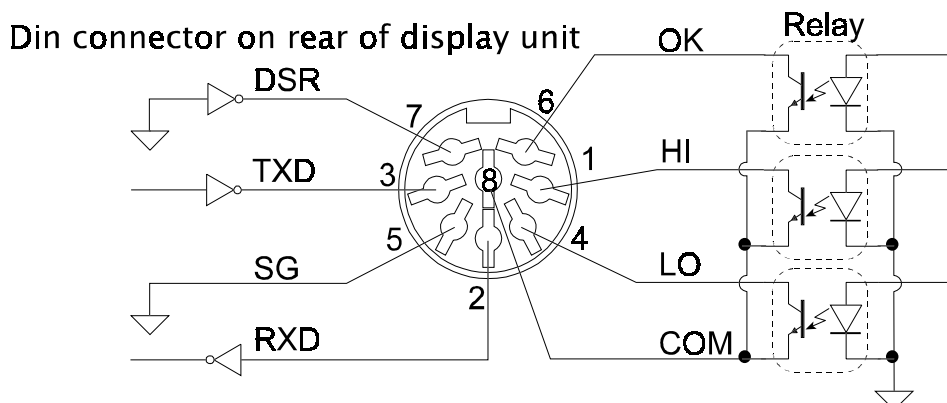
AX-KO557A, AX-KO1786-200

Pin connections

Pin No.	Signal name	Direction	Description
1	HI	Output	Relay output of HI
2	RXD	Input	Receive data
3	TXD	Output	Transmit data
4	LO	Output	Relay output of LO
5	SG	-	Signal ground (RS-232C)
6	OK	Output	Relay output of OK
7	DSR	Output	Data set ready
8	COM	-	Relay common terminal

Mating connector DIN 8pin, JA:TCS0586 (of accessory pack)

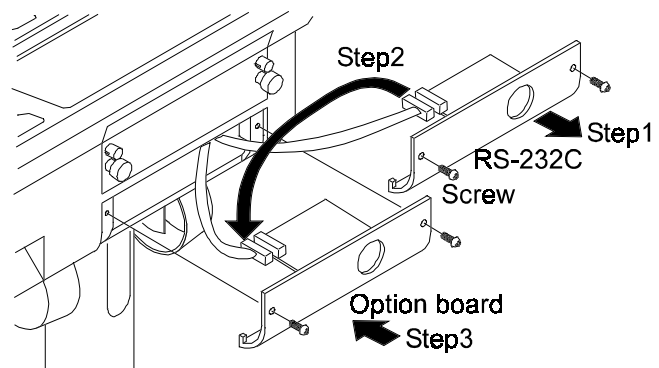
Circuit



Relay	Solid-state-relay	Maximum voltage	DC50V
		Maximum current	DC100mA
		Maximum ON resistance	8 Ω

Installing OP-03

- Step 1 Remove two screws that attach the RS232C board on the rear of the display unit. Remove the RS232C board.
- Step 2 Switch the connections.
- Step 3 Insert the option board into the display unit and afix with screws





17.2 RS-422 / RS-485 / Relay output (OP-04)

Replacing RS-232C interface with this option, the RS-422/ RS-485 interface can connect up to 16 scales and control them from a computer.

The RS-422/ RS-485 interface has the following two modes.

- Stream mode Outputs data countinuously.
- Command mode Controls the scale using commands from a computer.

It is necessary to set the parameters of the “Baud rate (F4)”, “Output mode (F5)”, “Format (F15)” in the function table in advance.

Transmission system EIA RS-422/ RS-485

Transmission Asynchronous, bi-directional, half-duplex

Data format Baud rate: 2400, 4800, 9600 bps

 Data: 7 bits

 Parity: 1 bit, Even

 Start bit 1 bit

 Stop bit 1 bit

 Code ASCII

 Terminator CR LF (CR: 0D[H], LF: 0A[H])

Address 01 ~ 99 Address parameter (F10) of function table.

Relay Solid-state-relay

 Maximum voltage DC50V

 Maximum current DC100mA

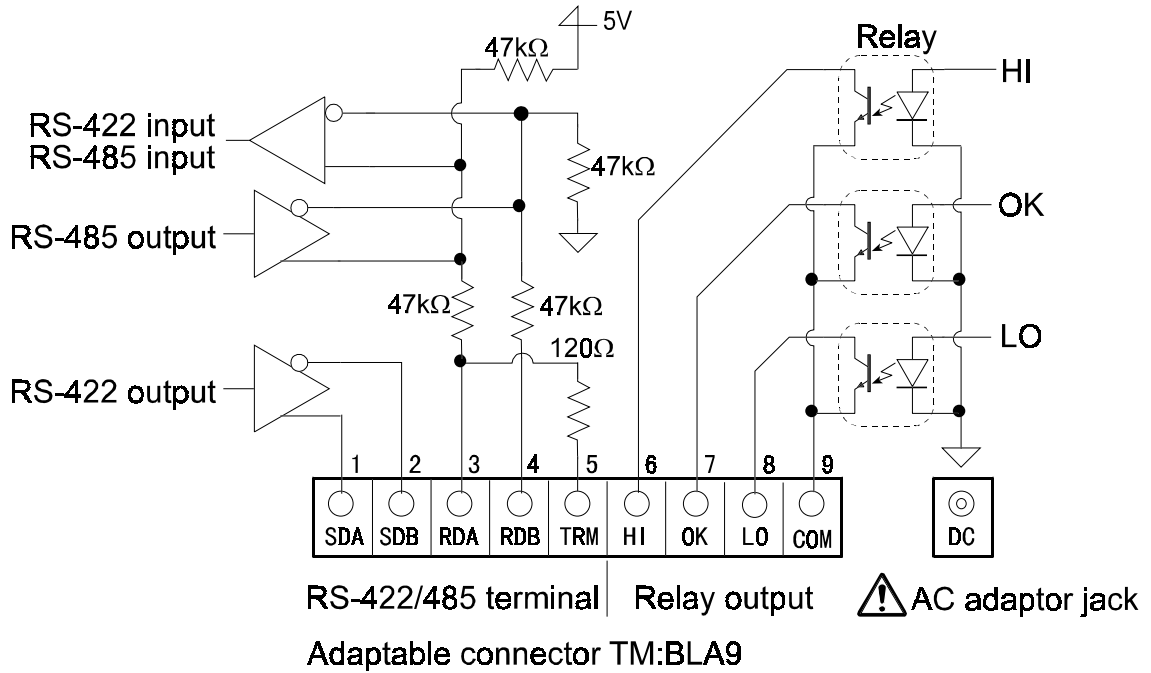
 Maximum resistance 8 Ω

Mating connector TM:BLA9 (of accessory pack)

Pin connections

Pin No.	Signal name	Direction	Description
1	SDA	Output	RS-422 transmission A terminal
2	SDB	Output	RS-422 transmission B terminal
3	RDA	Input Input / Output	RS-422 receive A terminal RS-485 transmission/ receive A terminal
4	RDB	Input Input / Output	RS-422 receive B terminal RS-485 transmission/ receive B terminal
5	TRM -		120Ω terminator
6	HI	Output	Relay output of HI
7	OK	Output	Relay output of OK
8	LO	Output	Relay output of LO
9	COM -		Relay common terminal

Circuit



Caution



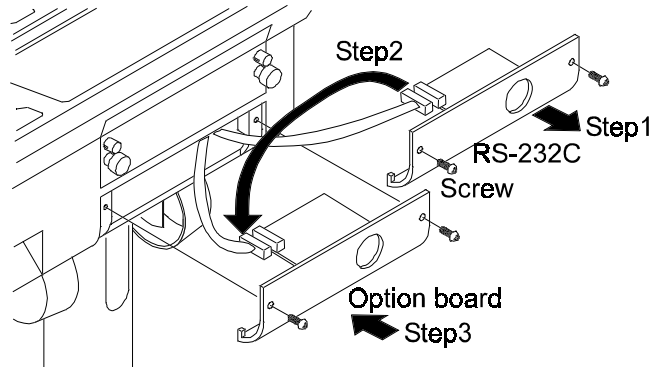
Please confirm that the AC adaptor type is correct for your local voltage and receptacle type.

Selection switch for the RS-422/ RS-485 interface

Selects either of RS-422 or RS-485 interface using a switch on the board.

Installing OP-04

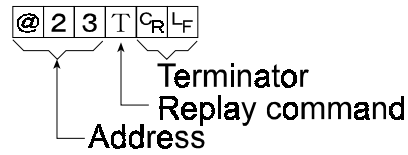
- Step 1 Remove two screws that attach the RS232C board on the rear of the display unit. Remove the RS232C board.
- Step 2 Switch the connections.
- Step 3 Insert the option board into the display unit and afix with the screws



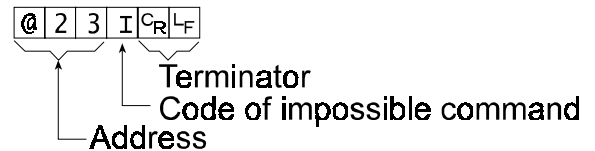
17.2.1 Communication Format

Commands consist of an address and the same command as for the RS-232C. Commands return the same command when there is no transmitting data. If address is 23, the reply is as follows:

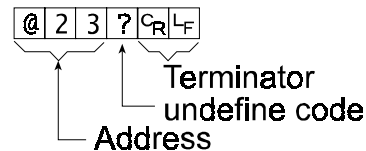
Normal response



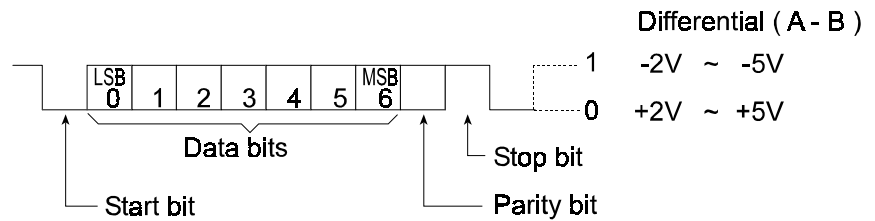
Response of impossible command



Undefined command response



Bit format



17.2.2 Command List

The following explanation uses “format 1 (F 15 0)” and assumes address is 23

Data output

The current weighing data is output.

Template Q

Command @ 2 3 Q CR LF

Reply @ 2 3 S T , + 0 0 0 1 2 . 4 0 k g CR LF

Selection of mode and unit

Selects the mode and unit. This is same as the MODE switch.

Template U

Command @ 2 3 U CR LF

Reply @ 2 3 U CR LF

The scale changes mode and unit

Zero

The current mass value is set to the zero point, this is same as the **ZERO** switch.

Template Z

Command

Reply

@	2	3	Z	C _R	L _F
---	---	---	---	----------------	----------------

@	2	3	Z	C _R	L _F
---	---	---	---	----------------	----------------

ue becomes zero and zero point mark is displayed.

Tare

The current mass value becomes zero after placing a tare (receptacle, case, etc) and the net is displayed. This is same as the **TARE** switch.

Template T

Command

Reply

@	2	3	T	C _R	L _F
---	---	---	---	----------------	----------------

@	2	3	T	C _R	L _F
---	---	---	---	----------------	----------------

mass value becomes zero and net mark is displayed.

Cancel of tare

The display value becomes the gross and the net mark is turned off. (The tare value becomes zero.)

Template CT

Command

Reply

@	2	3	C	T	C _R	L _F
---	---	---	---	---	----------------	----------------

@	2	3	C	T	C _R	L _F
---	---	---	---	---	----------------	----------------

ed and the net mark is turned off.

Preset tare

The tare value is set and the net is displayed. The net mark is displayed.

Template PT,[parameter]

Command

Reply

@	2	3	P	T	,	+	0	0	1	2	0	C _R	L _F
---	---	---	---	---	---	---	---	---	---	---	---	----------------	----------------

@	2	3	P	T	,	+	0	0	1	2	0	C _R	L _F
---	---	---	---	---	---	---	---	---	---	---	---	----------------	----------------

Upper limit value

An upper limit value is stored.

Template HI,[parameter]

Command

Reply

@	2	3	H	I	,	+	0	3	2	1	0	C _R	L _F
---	---	---	---	---	---	---	---	---	---	---	---	----------------	----------------

@	2	3	H	I	,	+	0	3	2	1	0	C _R	L _F
---	---	---	---	---	---	---	---	---	---	---	---	----------------	----------------

Lower limit value

A lower limit value is stored.

Template LO, [parameter]

Command

Reply

@	2	3	L	O	,	-	0	0	4	0	0	C _R	L _F
---	---	---	---	---	---	---	---	---	---	---	---	----------------	----------------

@	2	3	L	O	,	-	0	0	4	0	0	C _R	L _F
---	---	---	---	---	---	---	---	---	---	---	---	----------------	----------------

Caution The lower limit value must be less than the upper limit value.

Accumulation data output

Accumulated data is output.

Template A

Command @ 2 3 A C_R L_F

Reply @ 2 3 A , + 0 0 0 1 2 . 4 0 _ k g C_R L_F

Accumulation count output

Number of accumulations is output.

Template N

Command @ 2 3 N C_R L_F

Reply @ 2 3 N , + 0 0 0 0 0 1 4 0 _ _ _ C_R L_F

Reset of Accumulation data and number

Data and number of accumulations become zero.

Template CA

Command @ 2 3 C A C_R L_F

Reply @ 2 3 C A C_R L_F

Data and number of accumulations become zero.

Final value

The final value is stored.

Template S0, [parameter]

Command @ 2 3 S 0 , + 0 2 0 0 0 C_R L_F

Reply @ 2 3 S 0 , + 0 2 0 0 0 C_R L_F

The value is stored.

Preliminary value

The preliminary value is stored.

Template S1, [parameter]

Command @ 2 3 S 1 , + 0 0 2 0 0 C_R L_F

Reply @ 2 3 S 1 , + 0 0 2 0 0 C_R L_F

The value is stored.

Zero band

The zero band is stored.

Template S2, [parameter]

Command @ 2 3 S 2 , + 0 0 0 5 0 C_R L_F

Reply @ 2 3 S 2 , + 0 0 0 5 0 C_R L_F

The value is stored

17.3 Internal Printer for Type V (OP-06)

It is necessary to set the parameter of the "Print mode (F9)" in the function table in advance.

It is necessary to set the parameter of the "Date (F15)" on the function table in advance.

Caution The date Parameter is not updated automatically.



Specification

Kind 5x7 dot matrix impact type
Characters 16 characters in a line
Width of roll paper 44.5mm
Accessories a special roll paper, an ink ribbon

Consumables

Special roll paper AX-PP156
Ink ribbon AX-ERC-05

Operation and Print Samples

Pressing the  switch while pressing and holding the  switch, paper feed is performed.

Print sample of selecting print mode F9 1
~ F9 4

```
2.345 kg
2345pc
76.98%
```

Print sample of selecting print mode F9 5

```
99/12/31
001 1.345 kg
002 1.325 kg
1.330 kg
```

Print sample of displaying accumulation data

```
99/12/31
N 3
Total 7.810 kg
```

Installation of OP-06

Caution

This option cannot be used with type L (Liquid Crystal Display) scales.

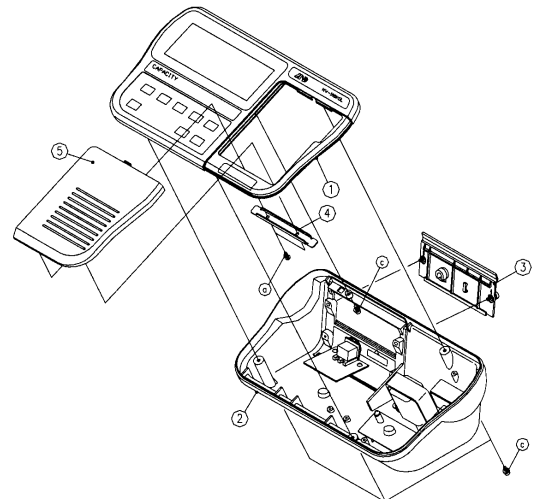
Packed with the option OP-06 are the following items which are used to install the printer into your scale.

Reference No.	Description	Quantity
6	Printer cover	1
7	Printer unit	1
8	Printer control board	1
a	Self tapping screw	3
b	Screw with washer	4
	Paper roll (PP-156)	1
	Spare ink ribbon (ERC-05)	1

Installation Method

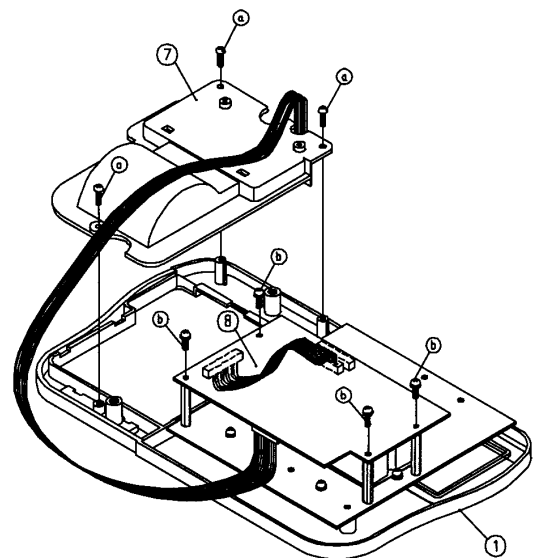
1. Disassembly

- Disconnect the scale power plug from the AC mains supply socket.
- Loosen the lock screws and remove the rear cover unit (Item 3)
- Loosen 4 x screws (Item c) and remove the upper case unit.
- Remove 2 screws (Item a) and remove the Battery Cover.

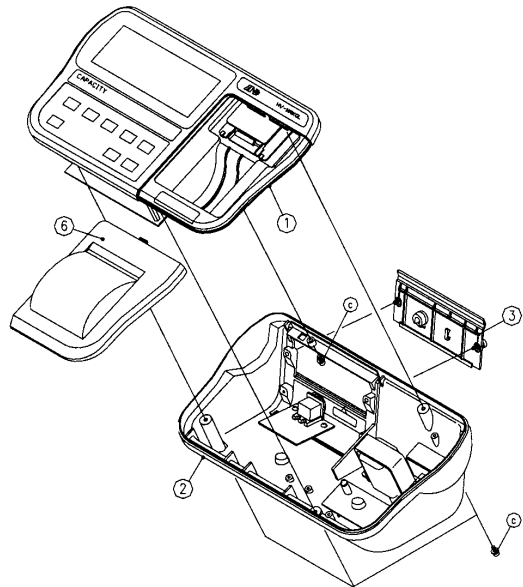


2. Installation

- Connect CN2, of the printer board (Item 8), to J5 on the main board (Item 1)
- Install the printer board (Item 8) to the 4 stand-offs on the board on the upper case (Item 1).
- Secure the printer unit (Item 7) to the upper case (Item 1).
- Connect the printer unit cable to CN4 on the printer board (Item 8).



- (a) Connect the cable between J2 and J3 on the upper case (Item 1).
- (b) Free the 2 pin cable on the lower case (Item 2) and connect it to CN1.
- (c) Screw the upper case (Item 1) to the lower case (Item 2) using the 4 screws (Items c).
- (d) Secure the rear cover (Item 3) to the lower case (Item 2) with the 2 lock screws.
- (e) Secure the printer cover (Item 6 to the upper case (Item 1).



3. Performance Check

- a) Press **ON/OFF** key while holding the **ZERO** key pressed.
- b) F1 will be displayed - press the **MODE** key.
- c) F 9 0 will be displayed - press the **RANGE** key.
- d) F 9 1 will be displayed - press the **MODE** key.
- e) F10 will be displayed - press the **F** key
- f) End will be displayed - press the **MODE** key.
- g) Prepare the paper roll and open the printer cover.
- h) While holding the **F** key, press the **PRINT** key and feed in the paper.
- i) Place a weight onto the scale and when the stable mark flashes press the **PRINT** key.

If the printed weight is correct then the installation has been successful.

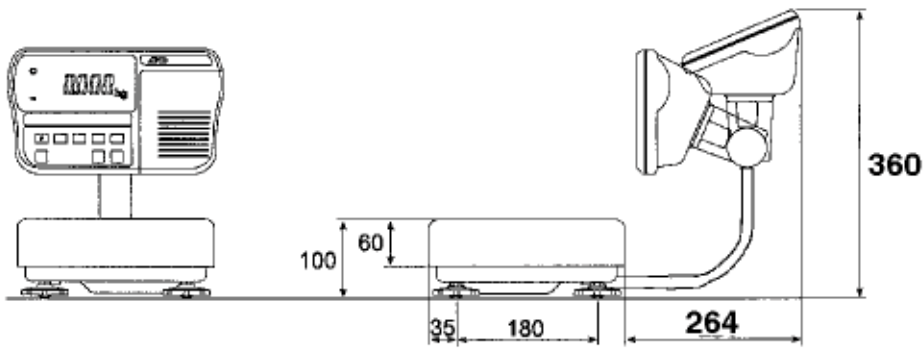


18 Specifications

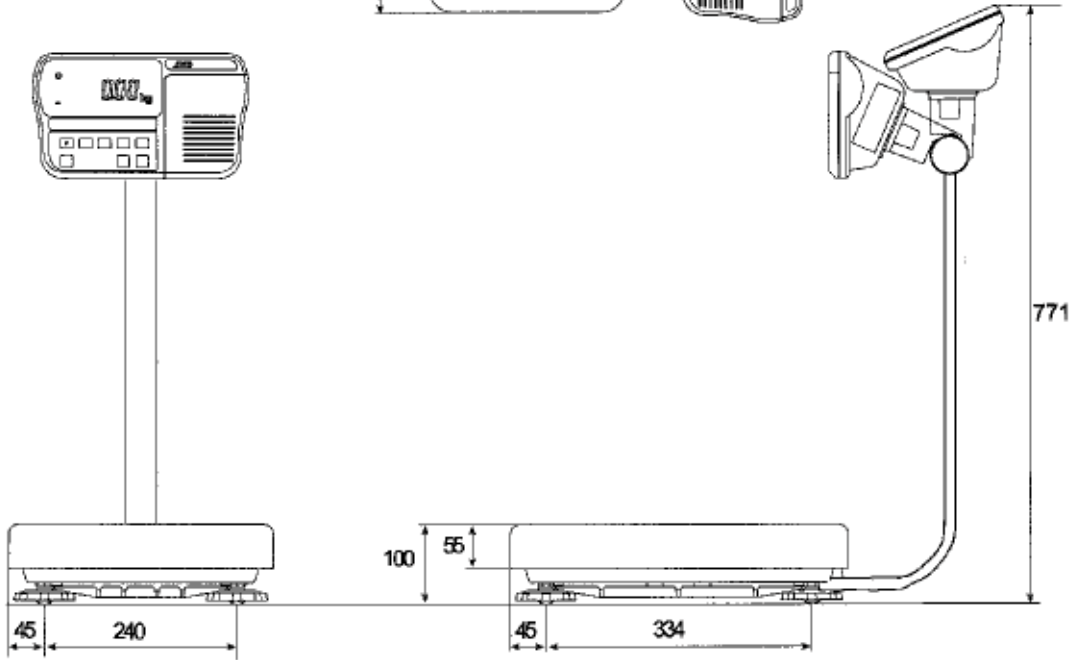
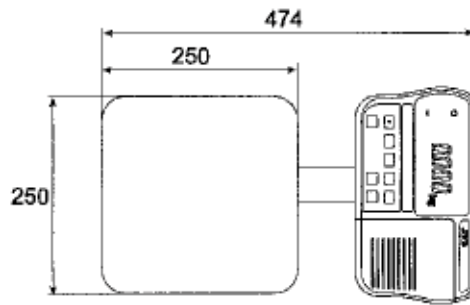
HV-G series

Product	HV-15KGL HV-15KGV			HV-60KGL HV-60KGV			HV-200KGL HV-200KGV		
Weighing Capacity [kg]	3	6	15	15	30	60	60	150	220
Min. weighing (1 digit) [g]	1	2	5	5	10	20	20	50	100
Number of samples in counting mode [units]	5*can be changed to 10*20*50*100*								
Max. count number [units]	15,000			12,000			11,000		
Display	HV-GL			7 segment liquid crystal display, Character height 25mm					
	HV-GV			7 segment fluorescent display, Character height 20mm					
Repeatability [g]	±1	±2	±5	±5	±10	±20	±20	±50	±100
Linearity [g]	±1	±2	±5	±5	±10	±20	±20	±50	±100
Span drift	20ppm/°C typ. (5°C ~ 35°C)								
Power source	HV-GL			AC adaptor Please confirm that the AC adaptor type is correct for your local voltage and receptacle. Battery x 6 pieces type D					
	HV-GV			Please confirm that the mains power type is correct for your local voltage and receptacle type.					
Battery life (HV-GL)	Approximately 600 hours with alkaline dry cell battery								
Ambient temperature and humidity	-10°C ~ 40°C, Less than 85%R.H. (Non-condensing)								
Weighing pan size [mm]	250 x 250			330 x 424			390 x 530		
Dimension [mm]	275 x 474 x 368			330 x 621 x 771			390 x 712 x 771		
Mass of scale [kg]	HV-GL			11			17		
	HV-GV			12			18		

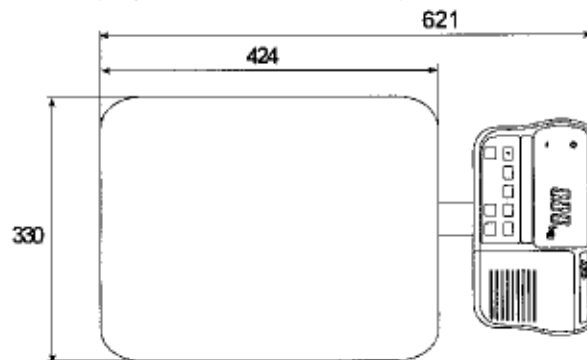
Dimensions

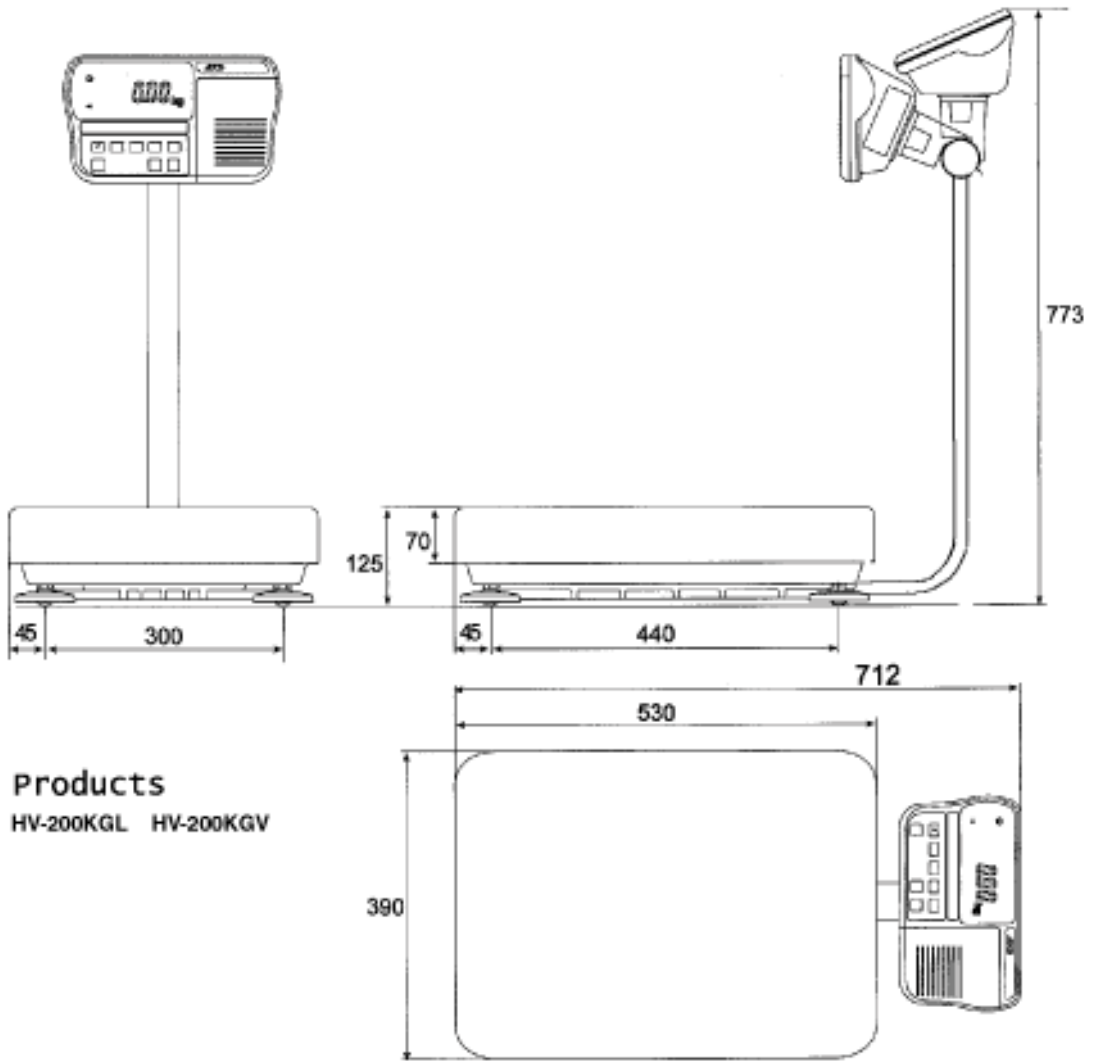


Products
HV-15KGL
HV-15GKV



Products
HV-60KGL
HV-60KGV





Products
 HV-200KGL HV-200KGV



19 Maintenance

Refer to “4. Caution” for use.

Refer to “6.1. Display and Symbols “ and corresponding mode for displayed error code.

Refer to “14. Calibration (Adjusting Scale)” for precision weighing.

Periodically check the accuracy of weighing. Calibrate the scale, if it is moved to another location or the environment has changed.



19.1 Repair

Do not disassemble/ assemble the scale without an authorised service engineer. It may cause an electric shock or damage to the scale, etc. In this case, repair is not covered under warranty. Contact your local A&D dealer if your scale needs service or repair.



19.2 Check Points Before Calling Maintenance

In this situation	Confirm these items
Nothing displayed. Scale does not turn on.	Is the AC adaptor properly connected? Is the AC adaptor the correct voltage ? Are the batteries dead ? Is the battery polarity correct ?
The scale does not display zero at first.	Check around weighing pan. Is there anything on the pan?
888888 is displayed and does not proceed	The weighing value is unstable due to drift, vibration or other Check around weighing pan. Check the connection of load cell cable.
----- is displayed and does not proceed.	Check around weighing pan. Remove anything on the pan. Make zero point calibration of the scale.
ERR E is displayed	Calibration error that means “Too heavy”.
-ERR E is displayed	Calibration error that means “Too light”.
E is displayed	Weighing error that means “Over load”.
-E is displayed	Weighing error that means “Under load”.
Fixed display	Do you use the “hold function”. Turn the scale off then on.