

# AD-4402

## INSTRUCTION MANUAL

---

### Multi Function Weighing Indicator

# AND

A&D Company, Limited

WM : PD4000243A



This is a hazard alert mark.



This mark informs you about the operation of the product.

Note This manual is subject to change without notice at any time to improve the product. No part of this manual may be photocopied, reproduced, or translated into another language without the prior written consent of the A&D Company.

Product specifications are subject to change without any obligation on the part of the manufacture.

Copyright©2001 A&D Company, Limited



# Contents

1.	Compliance.....	4
1.1.1.	Compliance with FCC rules.....	4
1.1.2.	Compliance with European Directives.....	4
2.	Outline and Features .....	5
2.1.	Precaution .....	6
2.2.	Front Panel.....	7
2.2.1.	Keys .....	7
2.2.2.	Symbols.....	8
2.3.	Rear Panel.....	10
3.	Installation.....	11
3.1.	Mounting Indicator .....	11
3.2.	Connecting Loadcell Cable.....	12
3.2.1.	Verifying Loadcell Output and Input Sensitivity .....	13
3.3.	Wiring Power Cord .....	14
3.4.	Installing Options.....	15
4.	Basic Operation .....	16
4.1.	Key Operation Examples .....	16
4.1.1.	Standby Mode .....	16
4.1.2.	Cursor Operation.....	16
4.1.3.	Inputting Characters.....	16
4.1.4.	The Way of Calling a Code.....	17
4.1.5.	The Way of Entering a Correction Mode .....	17
4.1.6.	The Way of Entering The Menu.....	18
4.2.	Status Chart (Mode map) .....	19
5.	Calibration.....	20
5.1.	Actual Load Calibration (using a Mass) .....	21
5.2.	Digital Span (Calibration without a Mass).....	22
5.3.	Gravity Acceleration Correction .....	23
5.3.1.	Gravity Acceleration Reference.....	23
5.4.	Calibration Error .....	24
6.	Applications .....	25
6.1.	Hopper Scale with Material Code .....	25
6.1.1.	Definition of a Material Code .....	25
6.1.2.	Recalling a Material Code .....	25
6.1.3.	Editing Principle Parameters of a Material Code.....	26
6.1.4.	Referring to the next Material Code.....	26
6.1.5.	Editing Full Parameters of a Material Code .....	27
6.2.	Simple Hopper Scale with a Recipe Code .....	30
6.2.1.	Definition of a Recipe Code.....	30
6.2.2.	Using a Recipe Code .....	31
6.2.3.	Construction of a Recipe Code.....	31
6.2.4.	Recalling a Recipe Code.....	31
6.2.5.	Arranging Material Code in a Recipe Code .....	32
6.2.6.	Editing Full Parameters of a Recipe Code.....	32

6.3.	System Design of a Hopper Scale .....	34
6.3.1.	Operation and I/O Design .....	34
6.3.2.	Design Example .....	34
7.	Weighing Mode .....	35
7.1.1.	Contents of the Batch Weighing Mode .....	35
7.2.	Batch Weighing Mode .....	36
7.2.1.	Selection of Batch Weighing .....	37
7.3.	Built-in Automatic Program Mode .....	39
7.3.1.	Normal Batching of Built-in automatic program mode .....	40
7.3.2.	Loss-in-weigh of the Sequential Mode .....	42
7.3.3.	Compensation Sequence .....	44
7.3.4.	Initial Flow Sequence .....	46
7.3.5.	Discharge Sequence .....	48
7.3.6.	Recipe Sequence .....	50
7.3.7.	Automatic Selection of Supplying Hopper .....	52
7.3.8.	Nozzle Control Sequence (vacuum cleaner) .....	53
7.3.9.	Mixing Sequence .....	54
7.3.10.	Safety Check Function .....	56
7.3.11.	Pause and Emergency Stop .....	56
7.3.12.	Restart Sequences from Pause .....	57
7.3.13.	Automatic Free Fall Compensation .....	58
7.3.14.	Real Time Free Fall Compensation .....	59
7.4.	Customer Programmed Control (Comparison Output) .....	61
7.4.1.	Normal Batching of the Customer Programmed Control Mode .....	62
7.4.2.	Loss-in-weigh of the Customer Programmed Control Mode .....	64
7.5.	Other Functions .....	66
7.5.1.	Re-Zero Operation .....	66
7.5.2.	Zero Tracking Function .....	66
7.5.3.	Tare .....	67
7.5.4.	Preset Tare (Fixed Tare Function) .....	67
7.5.5.	Customizing the Function Key (Key Design) .....	67
7.5.6.	Customizing the Sub Display .....	68
7.5.7.	Graphic Display .....	69
7.5.8.	Total Operation .....	70
7.5.9.	Undoing the Total Operation .....	70
7.5.10.	Clearing (Deleting) the Totaled Data .....	70
7.5.11.	Error Message and Alarm .....	71
7.5.12.	Graphic Status Indicator .....	73
7.5.13.	Memory Backup .....	73
8.	Interface .....	74
8.1.	Control I/O Function .....	74
8.1.1.	Interface Circuit .....	74
8.1.2.	Timing Chart .....	75
8.2.	Built-in RS-485 Interface .....	76
8.2.1.	Connection .....	76
8.2.2.	Settings of Parameters .....	77
8.2.3.	Timing Chart .....	78
8.2.4.	General Data Format .....	79
8.2.5.	A&D Data Format .....	80
8.2.6.	Address .....	80
8.2.7.	Command List .....	81

8.3.	Built-in Current Loop Output .....	84
8.3.1.	Connection .....	84
8.3.2.	Communication Modes.....	84
8.3.3.	Data Format .....	85
8.4.	BCD Output of Option OP-01 .....	85
8.5.	Relay Output of Option OP-02.....	89
8.6.	RS-422/485 Interface of Option OP-03.....	90
8.7.	RS-232C Interface of Option OP-04 .....	93
8.8.	Parallel I/O of Option OP-05.....	94
8.9.	Analog Output of Option OP-07 .....	95
9.	Maintenance .....	96
9.1.1.	Basic Operation.....	96
9.2.	Monitor Mode.....	96
9.2.1.	Monitoring the Control I/O Function.....	96
9.2.2.	Monitoring the Built-in RS-485 Interface.....	96
9.2.3.	Monitoring the Built-in Current Loop Output .....	97
9.2.4.	Monitoring the A/D Converter .....	97
9.2.5.	Monitoring the BCD Output of OP-01 .....	97
9.2.6.	Monitoring the Relay Output of OP-02 .....	97
9.2.7.	Monitoring the RS-422/485 Interface of OP-03 .....	98
9.2.8.	Monitoring the RS-232C Interface of OP-04.....	98
9.2.9.	Monitoring the Parallel I/O of OP-05.....	98
9.2.10.	Monitoring the Analog Output of OP-07 .....	98
9.3.	Test Mode.....	99
9.3.1.	Testing the Control I/O Function.....	99
9.3.2.	Testing the Built-in RS-485 Interface.....	99
9.3.3.	Testing the Built-in Current Loop Output .....	99
9.3.4.	Testing the A/D Converter .....	100
9.3.5.	Testing the BCD Output of OP-01 .....	100
9.3.6.	Testing the Relay Output of OP-02 .....	100
9.3.7.	Testing the RS-422/485 Interface of OP-03 .....	100
9.3.8.	Testing the RS-232C Interface of OP-04.....	101
9.3.9.	Testing the Parallel I/O of OP-05.....	101
9.3.10.	Testing the Analog Output of OP-07 .....	101
9.4.	Initializing Parameters .....	102
9.5.	Remote Operation .....	104
10.	Function List .....	105
10.1.1.	Operation Keys.....	105
10.1.2.	Outline of the Function List.....	106
10.2.	Referring Parameters .....	107
10.3.	Parameter Settings.....	107
10.4.	Parameter List .....	108
11.	Specifications.....	134
11.1.	Dimensions.....	137
11.2.	Accessories .....	137
12.	References .....	138
12.1.	Abbreviations.....	138
12.2.	ASCII Code for AD-4402 .....	139
12.3.	Index.....	140



# 1. Compliance

## 1.1.1. 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 Subpart 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 may cause some interference and under these circumstances the user would be required to take, at his own expense, whatever measures are necessary to eliminate the interference.  
(FCC = Federal Communications Commission in the U.S.A.)

## 1.1.2. Compliance with European Directives

---

**CE** This appliance complies with the statutory EMC (Electromagnetic Compatibility) directive 89/336/EEC and the Low Voltage Directive 73/23/EEC for safety of electrical equipment designed for certain voltages.

Note: The displayed value may be adversely affected under extreme electromagnetic influences.



## 2. Outline and Features

- The AD-4402 is a multi-function weighing indicator for batch weighing and filling weighing. This indicator has control I/O for weighing sequence and options.
- Large display  
This indicator has a blue vacuum fluorescent display (VFD).  
The character height of the main display is 18 mm.  
Current weighing data, material names, setpoints (comparison references) and total data are displayed at the same time.
- Operation guidance  
Messages that assist current operation are displayed on the front panel and anyone could operate the indicator without instruction manuals.
- Full weighing sequences  
The AD-4402 can combine multiple materials and is equipped with the recipe function. Equipped with a filling nozzle and agitation sequence.  
Using the forecast control function, the flow control can be performed that is equivalent to A/D conversion of 1000 times per second.
- RS-485 interface  
32 indicators can be connected to a programmable controller or a personal computer. These protocols are according to public formats.
- Options  
There are options of AC 250 V direct drive relay, serial interface, parallel interface, analog output and etc.  
There are options of CC-Link, DeviceNet and PROFIBUS.  
There are three expansion slots for options.
- Check mode during operation  
The monitor mode can confirm system status during operation.  
The test mode can test the Input / Output interface.  
Even if there is no monitor instrument, the interface can be confirmed.
- Recipes and raw material data stored in the indicator  
The recipe is described as combination of material codes and weights.  
The material code is described as the weighing sequence parameters for a raw material.
- Water-resistant panel  
The classification code of the front panel is equivalent to IP-65 of IEC 529 using the accessory rubber packing. The "IP-65" code is explained as follows:  
IP: International Protection.  
6: Against ingress of solid foreign objects.  
Dust-tight. No ingress of dust.  
5: Against ingress of water with harmful effects.  
Protected against water jets (no powerful jets). Water projected in jets against the enclosure from any direction shall have no harmful effects.



## 2.1. Precaution

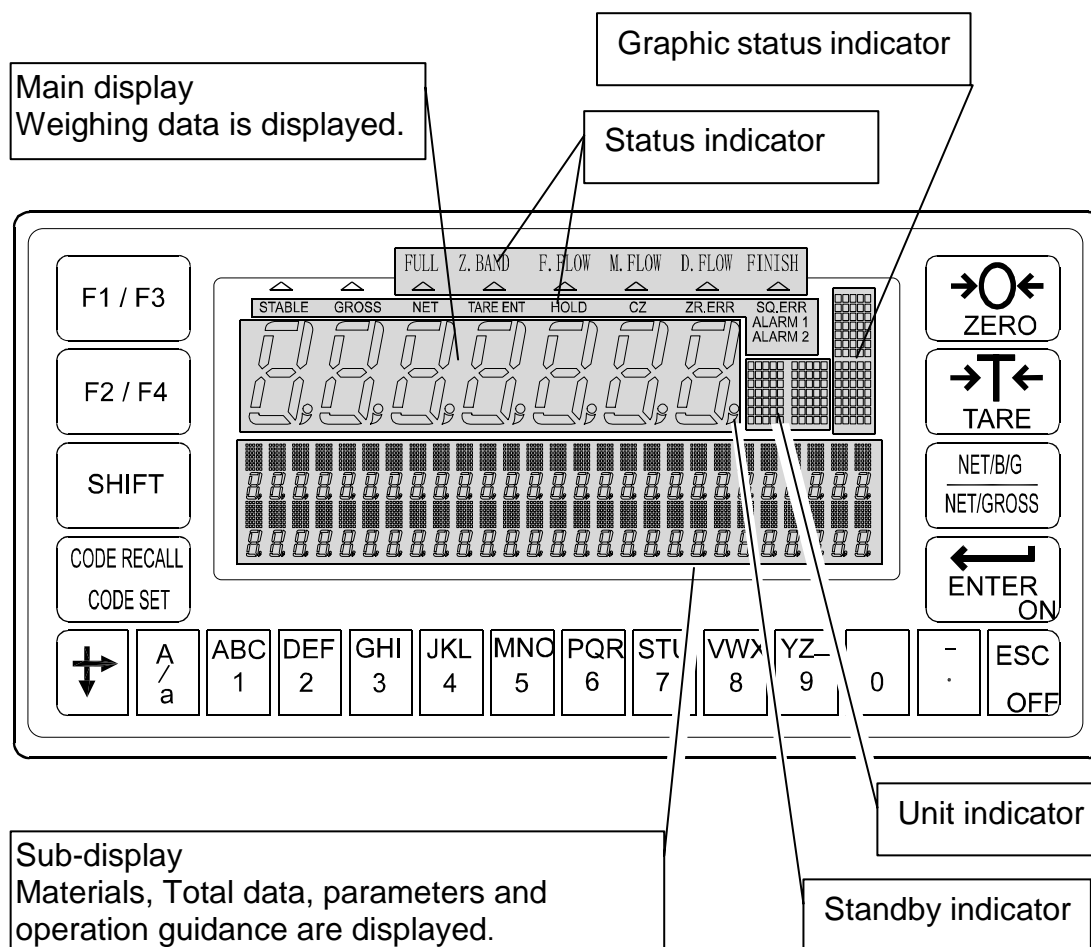
Before use, confirm the following articles for safe operation.

- Grounding the indicator  
Ground the indicator. The earth terminal ⊕ is on the rear panel.  
Separate this earth ground line from others, like ground line of a motor, inverter or a power source. Unless the indicator is grounded, it may cause the operator to receive an electric shock, cause operation error or catch fire
- Use adequate power cord  
Confirm the AC voltage and current of the power cord. If the voltage range of the cord is lower than the power line voltage, it may cause of a leak or catching fire. Use compression terminals to connect the power cord to the rear panel terminals.
- Fuse  
The fuse is installed to prevent the indicator from catching fire.  
The indicator has equipped many safety circuits. Therefore, the fuse is not broken in normal operation. If the fuse is broken, do not replace the fuse and contact your local or A&D dealer. This trouble may cause of an electric discharge of thunder.
- Splashing water  
The indicator is not water-resistant. When the indicator is mounted to a panel with the accessory rubber seal, the front panel is equivalent to IP-65.
- Flammable gas  
Do not install the indicator in any flammable gas.
- Heat radiation of the indicator  
Space out instruments to radiate heat sufficiently.
- Removing the cover  
Remove the power cord terminals from the power source before removing the cover to avoid receiving an electric shock.  
Do not touch the internal circuit within 10 seconds after turning off the indicator to avoid receiving an electric shock.





## 2.2. Front Panel



### 2.2.1. Keys



Pressing this key, the key works as the **F1** key.  
Pressing the **SHIFT** key and this key, the key works as the **F3** key.



Pressing this key, the key works as the **F2** key.  
Pressing the **SHIFT** key and this key, the key works as the **F4** key.



The key to select a function of a key.



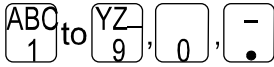
The key to open the material code or recipe code.  
Pressing the **SHIFT** key and this key, the key works as the material code edit key.  
Pressing the **ENTER** key and this key, the key works as the recipe code edit key.



The key to move the cursor or scroll the function number.  
Press and hold the **SHIFT** key and press the key to decrease the code number.



The key to select alphabetical keys, upper keys, lower keys or numerical keys.



**Alphanumeric** keys.



The escape key. Pressing and holding the key more than three seconds in normal weighing mode, the display is turned off (standby mode).  
The **ESC** key is used to undo the last key action and to return to the last mode.



The **ENTER** key for parameter settings.

The key to turn on the display.

Pressing this key and the key, the key works as the menu key.



The key to select net or gross



The tare key. The key is used to display the net value after that tare weight is subtracted from the gross weighing.



The zero key. To zero the current weighing display.

## 2.2.2. Symbols

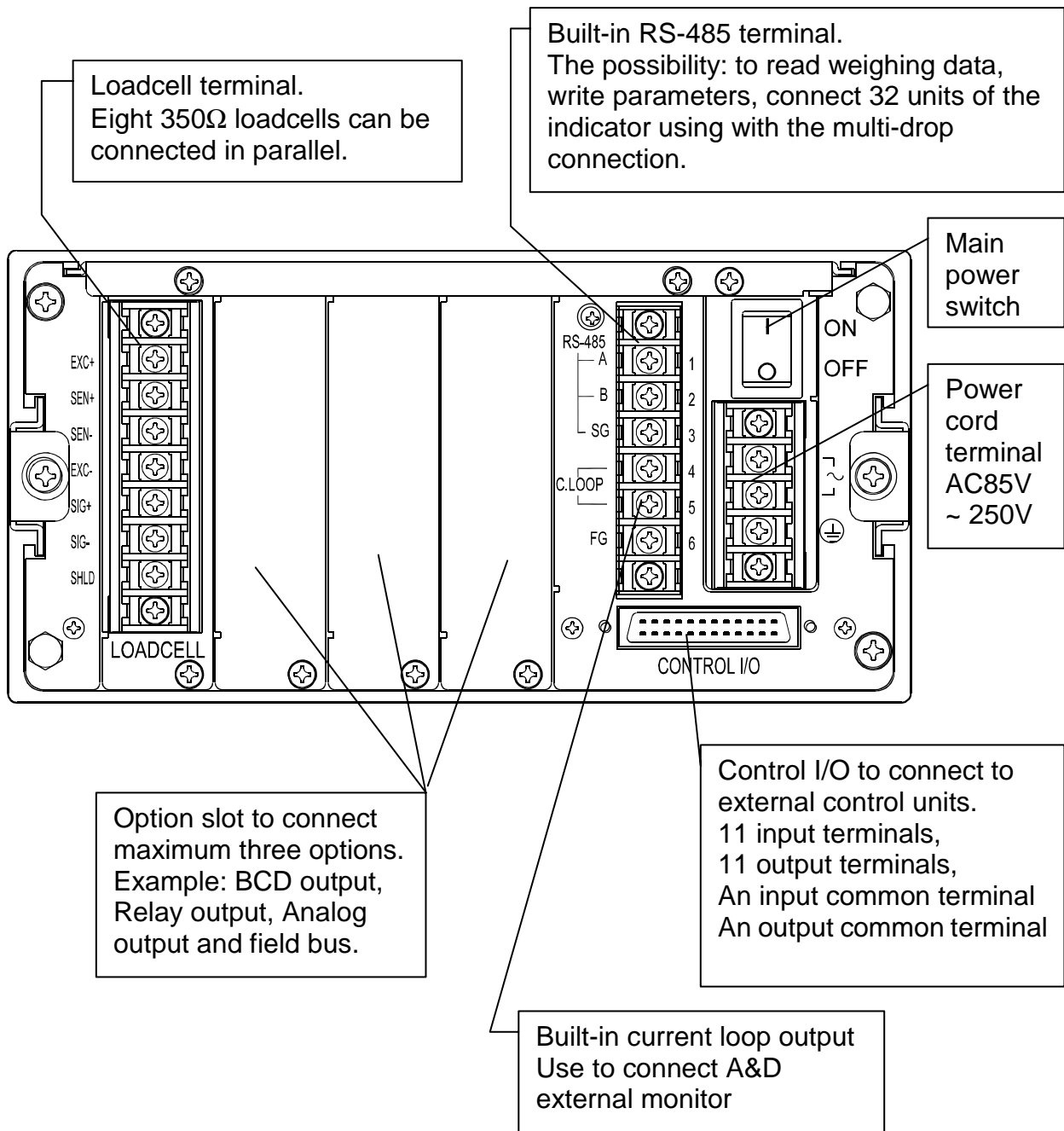
---

Main display	Gross or net is displayed.
Sub display	Code numbers, operation guidance, graph, setpoint and others are displayed selectively.
Unit indicator	The indicator that is displayed when the weighing unit is selected in the calibration mode. Refer to section "5. Calibration".
Status indicator	The current weighing status is displayed.
Graphic status indicator	The current weighing situation is displayed with symbols. The classification number is displayed, when an error occurred or an alarm is indicated.
STABLE	With this sign illuminated, the current weighing display is stable.
GROSS	The main display is the gross data, when this sign is illuminated.
NET	The main display is the net data, when this sign is illuminated.

TARE ENT	Tare entered. With the tare value stored, this sign is illuminated.
HOLD	With the main display held, this sign is illuminated.
CZ	Center of zero. When the gross weight is in the center of the zero point, this sign is illuminated.
ZR.ERR	Zero error. Error message for zeroing the gross data of the main display.
SQ.ERR	The sequence error sign. Indicates a weighing sequence error.
ALARM 1	An error sign for over load or emergency stop mode.
ALARM 2	A fatal error sign. Example: The wire from the loadcell is broken.
Standby indicator	In the standby mode, all interfaces are turned off and only the internal circuits work.
▲FULL	When the gross data exceeds the full limit, this sign is illuminated.
▲Z. BAND	The zero band sign. When the gross data is within the range of the zero band (around the zero point), this sign is illuminated.
▲F.FLOW	The full flow gate sign.
▲M.FLOW	The medium flow gate sign.
▲D.FLOW	The dribble flow gate sign.
▲FINISH	The batch finish sign.



## 2.3. Rear Panel





## 3. Installation

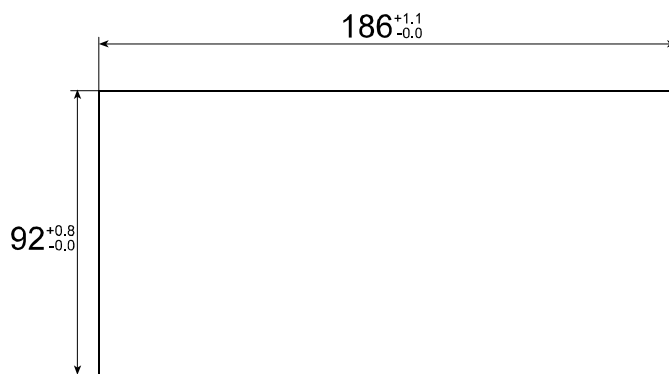
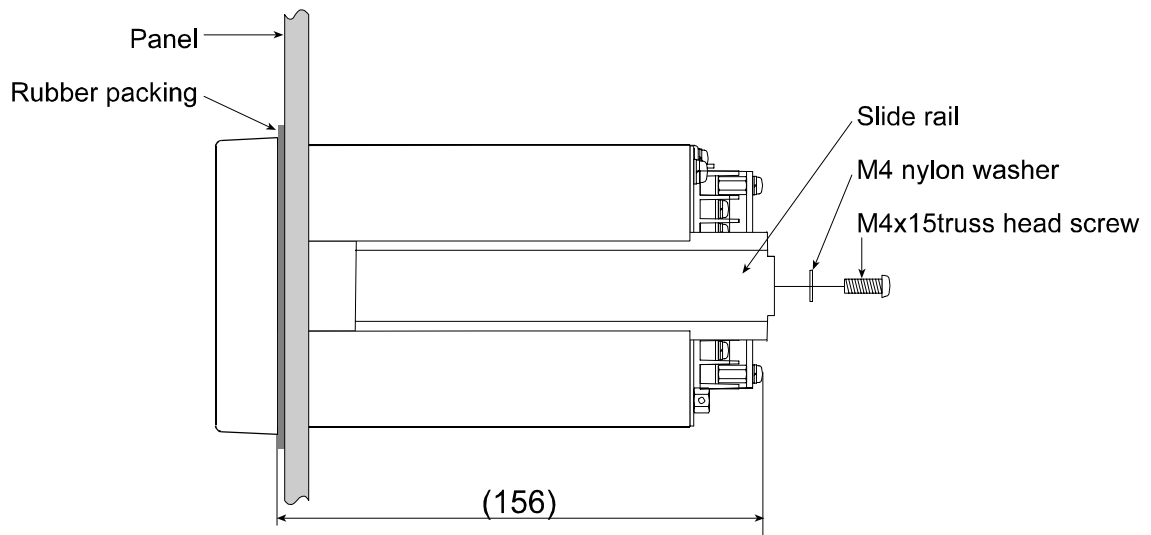
### Caution

- ❑ Remove the power cord before installing the indicator and an option.
- ❑ Turn off peripheral devices before installing it.
- ❑ Insert the options before installing the indicator.



### 3.1. Mounting Indicator

- ❑ The indicator can be mounted on a panel using the slide rail.
- ❑ If the accessory packing rubber is used, the front panel is equivalent to IP-65 of IEC 529.



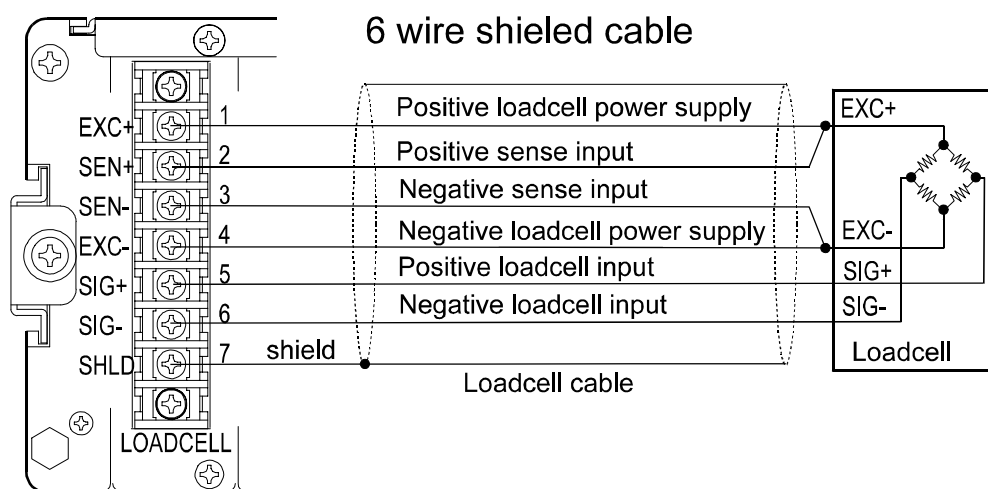
Panel Cutout size



## 3.2. Connecting Loadcell Cable

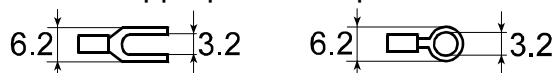
### Caution

- Do not share the loadcell cable with noise-generating devices or power lines, because the loadcell signal is very sensitive.
- We recommend that you use a 6 wire shielded cable to prevent loss of weighing precision.
- If the loadcell cable length is shorter than 5 m, you may use a 4 wire shielded cable with terminals 1 & 2 shorted (EXC+ & SEN+ shorted) and terminals 3 & 4 shorted (EXC- & SEN- shorted).



### Adaptable Compression Terminal Parts

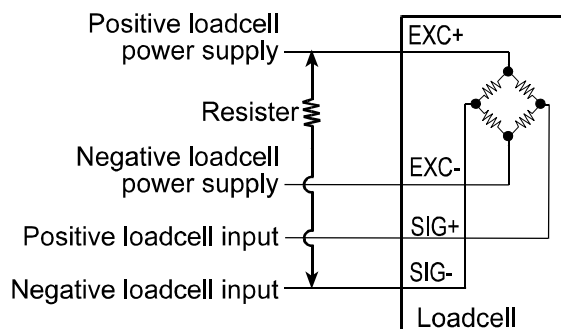
- Use the appropriate compression terminal parts to attach the cables.



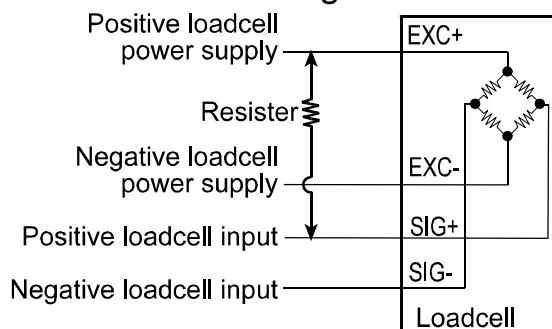
### Loadcell Output Adjustment for Zero Calibration (Zero Point)

- If the message "CERR2" is displayed, the zero point of zero calibration is too large.
- If the message "CERR3" is displayed, the zero point of zero calibration is too small.
- Use a resistor of more than 50 kΩ with low (good) temperature coefficient, when adding a resistor, to adjust the loadcell output, to the indicator terminals.

#### In Case of Positive Offset



#### In Case of Negative Offset



### 3.2.1. Verifying Loadcell Output and Input Sensitivity

The input sensitivity of the indicator is 0.3µV/division or more. Adapt to the following inequality, when you design a weighing instrument using the indicator and loadcell(s).

#### Caution

- A change in input voltage sensitivity is equivalent to a one division change of the display. Select as large an input voltage sensitivity voltage as possible so that the weighing interval becomes stable.
- Consider the leverage if a lever is used.

Weighing instrument using one loadcell.	$0.3 \leq \frac{E * B * D}{A}$	A: Rated capacity of loadcell [kg] B: Rated output [mV/V] D: Weighing interval [kg]
Weighing instrument using multi-loadcell	$0.3 \leq \frac{E * B * D}{A * N}$	E: Excitation voltage [mV] N: Number of loadcells

#### Verification Example

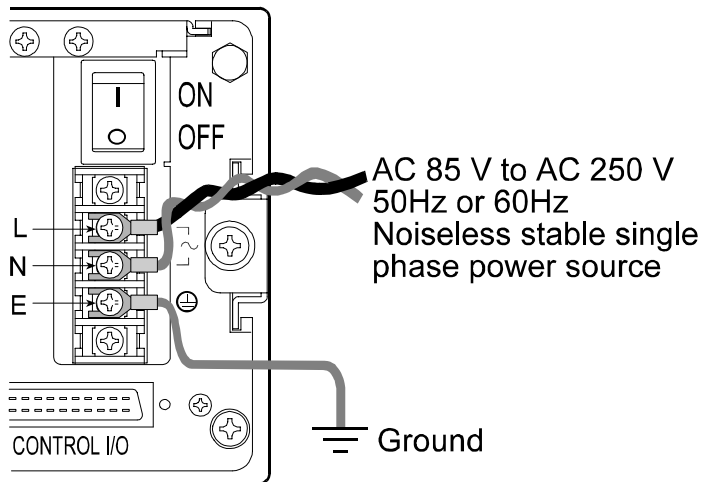
Design:		
Loadcell	N=1	
Rated capacity	A=750 [kg]	$\frac{5000 * 3 * 0.05}{750} = 1 \geq 0.3$ . Therefore, regard the instrument as a good design.
Rated output	B=3 [mV/V]	
Excitation voltage	E=5000 [mV]	
Weighing interval	D=0.05 [kg]	
Weighing capacity	300 [kg]	



## 3.3. Wiring Power Cord

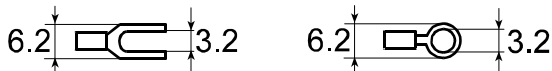
### Caution

- Ground the indicator using terminal E to avoid receiving an electric shock or an error due to discharge of static electricity.
  - Do not share the ground wire with an electrical device that generates noise.
  - Do not use an unstable power source.
  - Do not share the power cord with a motor system (a noise-generating device) to avoid operation error.
- 
- The power source can be from AC 85V to AC 250V with 50 Hz or 60 Hz.



### Adaptable Compression Terminal Parts

- Use the appropriate compression terminal parts to attach the cables.



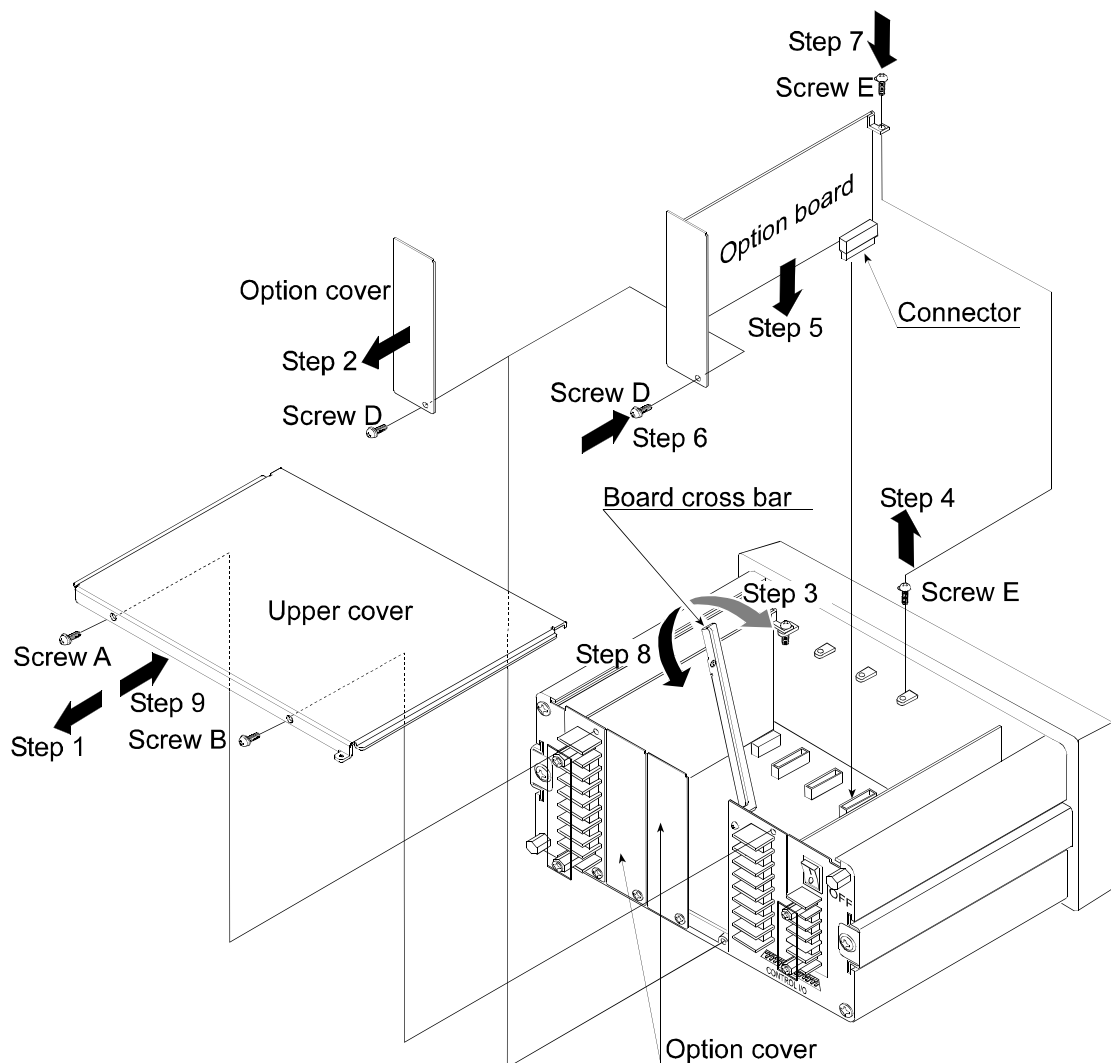




## 3.4. Installing Options

### Caution

- ❑ Remove the power cord before the operation to install an option.
  - ❑ Do not install the same options.
  - ❑ Do not touch the internal parts within ten seconds after removing the power cord because you may receive an electric shock.
  - ❑ Do not forget to tighten the screws. If a screw is not tightened, it may cause a short circuit or an error due to noise.
- 
- ❑ Three option boards can be installed in the slots.
  - ❑ Initialize the RAM data in accordance with section 9.4. Initializing Parameters.





## 4. Basic Operation



### 4.1. Key Operation Examples

- This section describes the way of key operation.

#### 4.1.1. Standby Mode

---

<b>OFF</b>	Press and hold the <b>OFF</b> key about three seconds in the weighing mode. Then the indicator enters the standby mode and displays the standby indicator. In the standby mode, All interface is turned off and only the internal circuits work.
<b>ON</b>	The <b>ON</b> key is used to turn on the indicator.

#### 4.1.2. Cursor Operation

---

There is a cursor on a segment (an item) that is turned on and off.

<b>↔</b>	The <b>↔</b> key is used to move the cursor forward.
<b>SHIFT + ↔</b>	Press and hold the <b>SHIFT</b> key and press the <b>↔</b> key to move the cursor backward.
<b>ENTER</b>	The <b>ENTER</b> key is used to enter the selected item.
<b>ESC</b>	The <b>ESC</b> key is used to return to the last mode and to undo the last key operation.

#### 4.1.3. Inputting Characters

---

A character can be input in a current segment (an item) in the appropriate mode.

<b>A/a</b>	The <b>A/a</b> key is used to change numerical key, upper keys, lower keys and alphabetical key.
<b>Alphanumeric</b>	The <b>alphanumeric</b> keys and the <b>ENTER</b> key are used to enter the parameters and to select a code number directly.
<b>ENTER</b>	The <b>ENTER</b> key is used to specify the alphanumeric data.
<b>ESC</b>	The <b>ESC</b> key is used to undo the last key operation and to return to the last mode.

## 4.1.4. The Way of Calling a Code

---

In Case of a Material Code:

Step 1 Suppose that the function parameter [5qf- 8] to [0] is set.

Step 2 Press the **CODE RECALL** key in the weighing mode.

Step 3 Set the number of a material code with the following keys:

<b>↕</b>	The <b>↕</b> key is used to increase the code number.
<b>SHIFT + ↕</b>	Press and hold the <b>SHIFT</b> key and press the <b>↕</b> key to decrease the code number.
<b>Numerical</b>	The <b>numerical</b> keys and the <b>ENTER</b> key is used to select a code number directly and to enter the parameters.
<b>ENTER</b>	The <b>ENTER</b> key is used to specify the number.
<b>ESC</b>	The <b>ESC</b> key is used to undo the last key and to return to the last mode.

In Case of a Recipe Code:

Step 1 Suppose that the function parameter [5qf- 8] to [1] or [2] is set.

Step 2 Press the **CODE RECALL** key in the weighing mode.

Step 3 Set the number of a recipe code with the following keys:

**↕, SHIFT + ↕, Numerical, ENTER, ESC** keys

## 4.1.5. The Way of Entering a Correction Mode

---

In Case of a Material Code:

Step 1 Press and hold the **SHIFT** key and press the **CODE RECALL** key in the weighing mode.

Step 2 Select the number of a material code using the following keys:

**↕, SHIFT + ↕, Numerical, ENTER, ESC** keys

Step 3 Edit some items of a material code using the **numerical** and **ENTER** keys.

Step 4 Press the **ESC** key to return to the weighing mode.

In Case of a Recipe Code:

Step 1 Press and hold the **ENTER** key and press the **CODE RECALL** key in the weighing mode.

Step 2 Select the number of a recipe code using the following keys:

**↕, SHIFT + ↕, Alphanumeric, A/a, ENTER, ESC** keys

Step 3 Edit some items of a recipe code using **alphanumeric** and **ENTER** keys.

Step 4 Press the **ESC** key to return to the weighing mode.

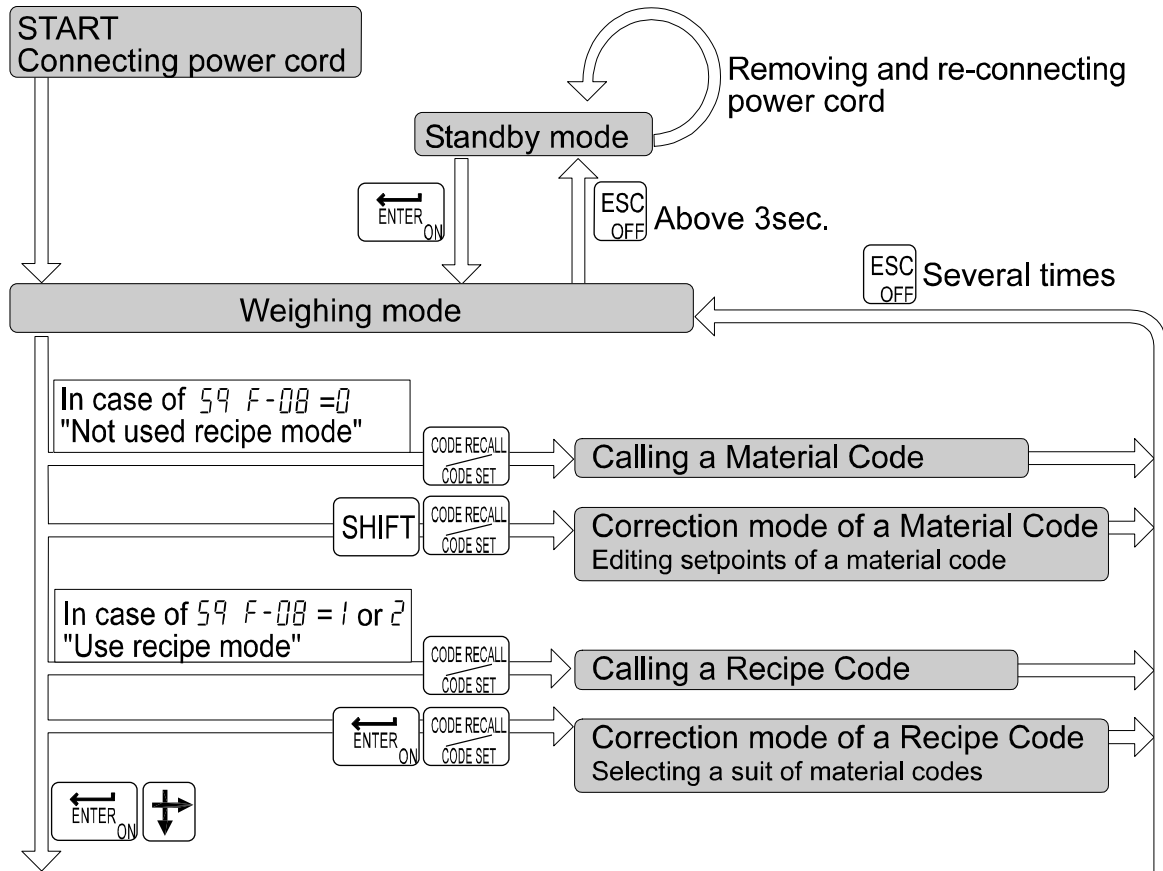
## 4.1.6. The Way of Entering The Menu

---

- Step 1 Press and hold the **ENTER** key and press the **↵** key in the weighing mode.  
Then the first layer of menu is displayed.
- Step 2 Use the following keys in the menu :  
**↵**, **SHIFT**, **Alphanumeric**, **A/a** , **ENTER**, **ESC** keys
- Step 3 Press the **ESC** key several times to return to weighing mode.



## 4.2. Status Chart (Mode map)



### Outline of Menu

MatEDIT	Material Edit	Edit	
		Search	
		Delete	Total, Setpoints and Total, All Totals, All Material Codes
		Copy	
		Tare	
RecipeEDIT		Edit	
		Search	
		Delete	Total, Recipe and Total, All Totals, All Recipe Codes
		Copy	
		Tare	
CAL	Calibration	CAL	Actual Load Calibration (using Mass) or Digital Span (Calibration without Mass)
			Gravity Acceleration Correction
Function	Parameters List	Reference Mode	General, Sequence, Control I/O, Serial function, Option
		Edit Mode	General, Sequence, Control I/O, Serial function, Option
Check		Monitor Mode	Control I/O, RS-485, Current Loop, internal A/D, OP-01, OP-02, OP-03, OP-04, OP-05, OP-07
		Test Mode	Control I/O, RS-485, Current Loop, internal A/D, OP-01, OP-02, OP-03, OP-04, OP-05, OP-07
System Management		Initialization	
		Remote Setup	

Use , , principally.



## 5. Calibration

- The indicator, which is connected to a loadcell unit, can weigh the "weight" value on the loadcell pan and display its "mass" value. The calibration function is used to adjust the displayed value so that the weighing system can weigh correctly.
- There are two ways of calibration. The "**actual load calibration**" uses a rated mass and zero output from the loadcell. The "**digital span**" inputs arbitrary values (calculated by hand). These methods are selected in the calibration procedure.
- There is a compensation function of the "**gravity acceleration correction**". This function is used, when a calibrated weighing system is moved to another place.
- The calibration parameters are stored in the indicator without any power supply.

### Common Calibration Items

Unit	The "g", "kg" and "t" or "lb" can be selected (lb: USA only).
Decimal point	The decimal point can be selected from "not used" to "four decimal places".
Minimum division	The minimum division of the weighing display.
Weighing capacity	The maximum display of the weighing display.

### Items for the "Actual Load Calibration"

Common items	Unit, decimal point, minimum division and weighing capacity
Zero point adjustment	A zero point output is used from the loadcell unit.
Span adjustment	Rated mass is placed on the weighing pan and is weighed. The sensitivity is adjusted. This sensitivity is the same as "sensitivity" of digital span.

### Items for "Digital Span"

Common items	Unit, decimal point, minimum division and weighing capacity
Zero point output	The numerical data is input as the zero point output of the loadcell unit.
Rated capacity	The rated capacity of the loadcell is input.
Sensitivity	The sensitivity of the loadcell is input.

### Caution

- **When the CAL switch on the A/D board is "DISABLE", no calibration can be performed.**
- **Do not perform any calibration during a weighing sequence operation.**
- **Entering calibration mode during a weighing sequence operation, the weighing sequence operation is terminated. Calibrate the weighing system only when the weighing sequence operation has stopped**
- **The accuracy of the "Digital Span (Calibration without Mass)" is 1/1000.**
- **Do not use a "loadcell summing box", when the "digital span" is performed.**
- **It is necessary that the loadcell sensitivity is exactly known, if the "digital span" is used.**



## 5.1. Actual Load Calibration (using a Mass)

**ESC** key If you want to return to the weighing mode during the calibration mode, press the **ESC** key anytime. It is effective until the last displayed parameter.

Example: zero adjustment only, etc.

**ENTER** key When the key is pressed, the procedure stores the current parameter and proceeds to the next step.

- Step 1 Press and hold the **ENTER** key and press the **↕** key to display the menu in the weighing mode.
- Step 2 Press the **↕** key twice to select the menu **CAL**.  
Press the **ENTER** key to enter the calibration mode.
- Step 3 Press the **ENTER** key to enter the menu **CAL**.
- Step 4 Select a unit using the numerical keys and press the **ENTER** key to store it.
- Step 5 Select a decimal point using the numerical keys and press the **ENTER** key to store it.
- Step 6 Select a minimum division using the numerical keys and press the **ENTER** key to store it.
- Step 7 Select a weighing capacity using the numerical keys and press the **ENTER** key to store it.
- Step 8 Perform the zero point adjustment.  
Place nothing on the weighing pan and press the **ENTER** key to store it after the **STABLE** indicator is displayed.  
Whether the **STABLE** indicator is displayed or not, if you want to store it, wait for ten seconds and press the **ENTER** key.
- Step 9 If the **F1** key is pressed, it will branch out to the digital span.
- Step 10 Specify a total mass value to place on the weighing pan using the numerical keys and press the **ENTER** key to store it.
- Step 11 Place the specified mass on the weighing pan and press the **ENTER** key to store it after the **STABLE** indicator is displayed.  
Whether the **STABLE** indicator is displayed or not, if you want to store it, wait for ten seconds and press the **ENTER** key.
- Step 12 Press the **ESC** key to return the weighing mode.



## 5.2. Digital Span (Calibration without a Mass)

**ESC** key If you want to return to the weighing mode during the calibration mode, press the **ESC** key anytime. It is effective until the last displayed parameter.

Example: zero adjustment only, etc.

**ENTER** key When the key is pressed, the procedure stores the current parameter and proceeds to the next step.

- Step 1 Press and hold the **ENTER** key and press the **↕** key to display the menu in the weighing mode.
- Step 2 Press the **↕** key twice to select the menu CAL.  
Press the **ENTER** key to enter the calibration mode.
- Step 3 Press the **ENTER** key to enter the menu CAL.
- Step 4 Select a unit using the numerical keys and press the **ENTER** key to store it.
- Step 5 Select a decimal point using the numerical keys and press the **ENTER** key to store it.
- Step 6 Select a minimum division using the numerical keys and press the **ENTER** key to store it.
- Step 7 Select a weighing capacity using the numerical keys and press the **ENTER** key to store it.
- Step 8 Press the **F1** key to proceed to the next step.
- Step 9 Store the zero point value.  
If you need a new the zero point value, input it using the numerical keys and press the **ENTER** key to store it.  
If you do not need a new the zero point value, press the **ENTER** key to preceed the next step.
- Step 10 Input the rated capacity of a loadcell using the numerical keys and press the **ENTER** key to store it.
- Step 11 Input the sensitivity of the loadcell in the unit of mV/V using the numerical keys and press the **ENTER** key to store it.
- Step 12 Press the **ESC** key to return the weighing mode.

**Advise** The digital span can be used for trimming of the actual load calibration using a mass.





## 5.3. Gravity Acceleration Correction

- The function compensates for weighing error due to the difference of gravity acceleration.

**G1** The place where the weighing system is calibrated.

**G2** The place where the weighing system is used.

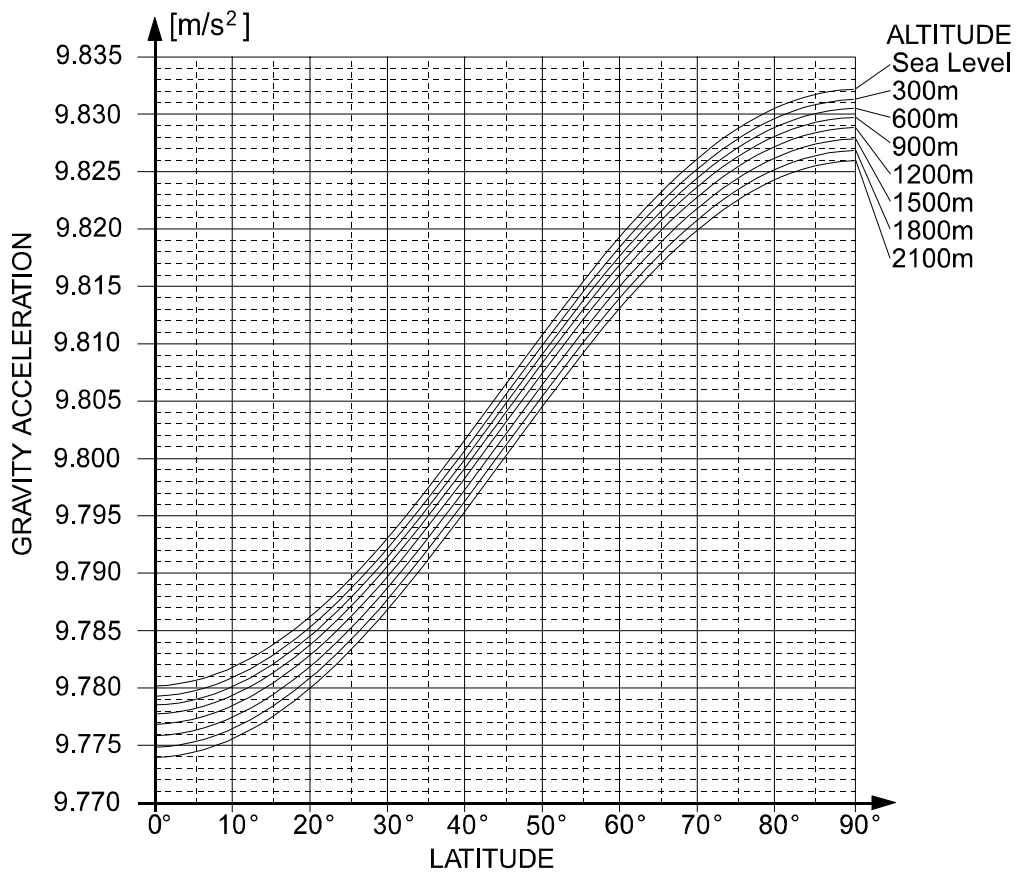
**ESC** key If you want to return to the weighing mode during the calibration mode, press the **ESC** key anytime.

**ENTER** key When the key is pressed, the procedure stores a current parameter and proceeds to next step.

- Step 1 Press and hold the **ENTER** key and press the **↵** key to display the menu in the weighing mode.
- Step 2 Press the **↵** key twice to select the menu CAL. Press the **ENTER** key to enter the calibration mode.
- Step 3 Select the menu G with the **↵** key. Press the **ENTER** key to enter it.
- Step 4 Input the gravity acceleration at G1 using the numerical keys and press the **ENTER** key to store it.
- Step 4 Input the gravity acceleration at G2 using the numerical keys and press the **ENTER** key to store it.
- Step 5 Press the **ESC** key to return the weighing mode.

### 5.3.1. Gravity Acceleration Reference

Amsterdam	9.813 m/s <sup>2</sup>	Manila	9.784 m/s <sup>2</sup>
Athens	9.800 m/s <sup>2</sup>	Melbourne	9.800 m/s <sup>2</sup>
Auckland NZ	9.799 m/s <sup>2</sup>	Mexico City	9.779 m/s <sup>2</sup>
Bangkok	9.783 m/s <sup>2</sup>	Milan	9.806 m/s <sup>2</sup>
Birmingham	9.813 m/s <sup>2</sup>	New York	9.802 m/s <sup>2</sup>
Brussels	9.811 m/s <sup>2</sup>	Oslo	9.819 m/s <sup>2</sup>
Buenos Aires	9.797 m/s <sup>2</sup>	Ottawa	9.806 m/s <sup>2</sup>
Calcutta	9.788 m/s <sup>2</sup>	Paris	9.809 m/s <sup>2</sup>
Chicago	9.803 m/s <sup>2</sup>	Rio de Janeiro	9.788 m/s <sup>2</sup>
Copenhagen	9.815 m/s <sup>2</sup>	Rome	9.803 m/s <sup>2</sup>
Cyprus	9.797 m/s <sup>2</sup>	San Francisco	9.800 m/s <sup>2</sup>
Djakarta	9.781 m/s <sup>2</sup>	Singapore	9.781 m/s <sup>2</sup>
Frankfurt	9.810 m/s <sup>2</sup>	Stockholm	9.818 m/s <sup>2</sup>
Glasgow	9.816 m/s <sup>2</sup>	Sydney	9.797 m/s <sup>2</sup>
Havana	9.788 m/s <sup>2</sup>	Tainan	9.788 m/s <sup>2</sup>
Helsinki	9.819 m/s <sup>2</sup>	Taipei	9.790 m/s <sup>2</sup>
Kuwait	9.793 m/s <sup>2</sup>	Tokyo	9.798 m/s <sup>2</sup>
Lisbon	9.801 m/s <sup>2</sup>	Vancouver, BC	9.809 m/s <sup>2</sup>
London (Greenwich)	9.812 m/s <sup>2</sup>	Washington DC	9.801 m/s <sup>2</sup>
Los Angeles	9.796 m/s <sup>2</sup>	Wellington NZ	9.803 m/s <sup>2</sup>
Madrid	9.800 m/s <sup>2</sup>	Zurich	9.807 m/s <sup>2</sup>



## 5.4. Calibration Error

Error Code	Situation and Treatment
CERR1	Resolution (Weighing capacity / minimum division) exceeds the limitation. Increase minimum division or decrease weighing capacity.
CERR2	The initial load (no load output) is larger than 2mV/V. Check the loadcell cable.
CERR3	Negative loadcell output value. Check the loadcell cable.
CERR4	Mass value exceeds the weighing capacity. Use a mass within the weighing capacity. (Decrease mass value)
CERR5	Mass value is too light for the calibration. Increase mass value.
CERR6	The loadcell output to be equivalent to the minimum division is too small. Use a more rough minimum division.
CERR7	The polarity of the loadcell output is reversed. Check the loadcell cable.
CERR8	The mass value of the weighing capacity exceeds 3.2 mV/V. Confirm the mass and weighing capacity.
CERR9	Gravity acceleration is out of range. Correct the value within the range of 9.770 ~ 9.835 m/s <sup>2</sup> .
CERR10	Zero output of the loadcell unit is out of range. Trim the zero output within 0.0 ~ 2.0 mV/V.
CERR11	The loadcell output to be equivalent to minimum division is out of range. Trim the output within 0.0 ~ 3.2 mV/V.



## 6. Applications

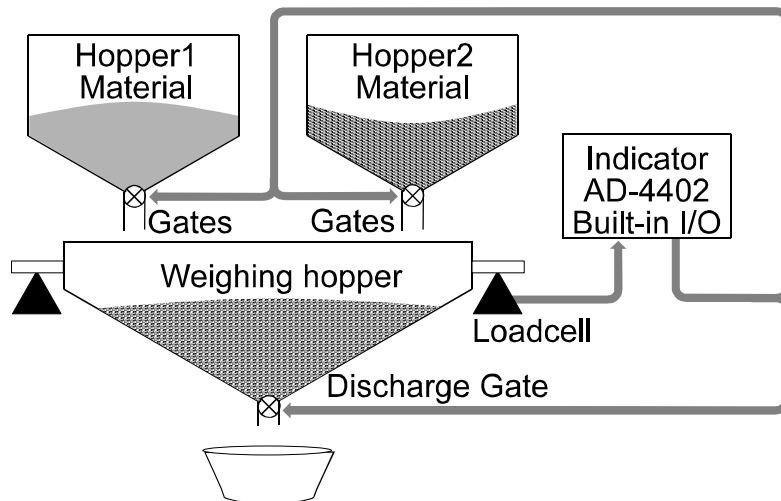


### 6.1. Hopper Scale with Material Code

In the section, applications are explained according to the right hopper scale that performs batch weighing using a material code.

An application is explained with mixing of materials using a recipe code.

The foundation of the hopper scale design is explained.



Example: Basic Hopper Scale

#### 6.1.1. Definition of a Material Code

- ❑ The material code is necessary to store the details before use. And the code is called with a code number in a weighing.
- ❑ The material code is used in the procedure that performs batch weighing or loss-in-weigh. As the result of the procedure, a constant weight of the material can be got.
- ❑ The material code consists of some index number (name) and some setpoints (comparison values) to get a constant weight of the material.
- ❑ The AD-4402 can store one hundred kinds of material codes.

#### 6.1.2. Recalling a Material Code

The following steps explain how to recall the material code stored in the indicator. Suppose that the recipe code is not used. (The menu [Function] - [Function setting] - [Sequence] - [Basic] - [Recipe mode] is set to [5q f- 8] [0] )

##### Caution

**The material code can be recalled during the last weighing. But the code is in effect only after the batch finish (after finishing the last weighing).**

Step 1 Press the **CODE RECALL** key.

Then the material code indicator blinks.

Step 2 Enter the material code using the **numerical** keys

The details of the material code are displayed in the sub-display.

Step 3 Press the **ENTER** key to decide the code.

### 6.1.3. Editing Principle Parameters of a Material Code

---

You can edit the parameters of final weight, free fall etc. displayed on the sub-display during a weighing. Items of the sub-display can be selected at the menu [Function] - [Function setting] - [General] - [Sub-display].

#### Caution

**If the flash memory is selected for memory backup (0tHf-11), the current batch weighting is stopped while editing them.**

- Step 1 Press and hold the **SHIFT** key and press the **CODE RECALL** key.  
Then the material code blinks.
- Step 2 Enter the material code using the **numerical** keys  
The details of the material code are displayed on the sub-display.
- Step 3 Press the **ENTER** key to decide the code.
- Step 4 Select a parameter using the **↔** key on the sub-display.
- Step 5 Enter the parameter using **numerical** keys and press the **ENTER** key to store it.
- Step 6 If you continue the change, proceed step 4 and 5.
- Step 7 If you want to finish the change, press the **ESC** key several times to return to the weighing mode.

### 6.1.4. Referring to the next Material Code

---

You can refer to next material code in the sequential mode that uses multiple material codes. Suppose that the recipe code is not used. (The menu [Function] - [Function setting] - [Sequence] - [Basic] - [Recipe mode] is set to [5q f- 8] [0])

- Step 1 Press the **CODE RECALL** key.  
Then principle parameters of the next material code are displayed in the sub-display.
- Step 2 Press the **ESC** key to return to current mode.

## 6.1.5. Editing Full Parameters of a Material Code

- A material code consists of the following parameters.

Name	Display Name	Display Symbol	Display Example	Memory
Material Code	Code	Code	11	Backed up RAM (factory setting) or flash memory
Material name	Mat Name		grain	
Material Hopper No.	Mat Hopper	Hopper	1	
Final	Final	Final	10.00 kg	
Free Fall	Free Fall	FFall	0.01 kg	
Preliminary	Preliminary	Plm	1.00 kg	
Optional Preliminary	OP. Preliminary	OPPlm	2.00 kg	
Over	Over	Over	0.10 kg	
Under	Undr	Undr	0.10 kg	
Zero Band	Zero Band	OBand	0.02 kg	
Full	Full	Full	0.05 kg	
Tare	Tare	Tare	5.00 kg	
Supplementary Flow Open Timer	SF open timer	SFOT	0.00 s	
Supplementary Flow Close Timer	SF close	SFCT	0.0 s	
Automatic Free Fall Range	AFFC range	AFFC	0.00 kg	
Initial Dribble Flow	Initial DF	IDF	0.00 kg	
Initial Medium Flow	Initial MF	IMF	0.00 kg	
Total Weight	Tot	Tot	10.00 kg	Backed up RAM
Total Count	Tot#	Tot#	1	

- These parameters are stored in backup memory even without power.
- Refer to the backup method [0tHf-11] of the function list.

### Caution

**If the flash memory is selected for memory backup [0tHf-11], the current built-in automatic program mode is stopped.**

### Edit a Material Code

Step 1 Press and hold the **ENTER** key and press the **↔** key.

Then menu MatEdit blinks.

Step 2 Press the **ENTER** key to enter the material code edit. Then menu Edit blinks.

Step 3 Press the **ENTER** key to enter menu edit.

Step 4 Select the material code using the **numerical** keys and press the **ENTER**.

Step 5 Enter the material name using the **alphanumeric** keys and press the **ENTER** key.

Step 5 Edit other parameters using the **numerical** keys, **ENTER** key and **↔** key.

Step 6 If you want to finish the change, press the **ESC** key several times to return to the weighing mode.

## Search a Material Code

Use this menu to search for blank material code.

- Step 1 Press and hold the **ENTER** key and press the **↔** key.  
Then menu `MatEdit` blinks.
- Step 2 Press the **↔** key to select menu `Search`. And press the **ENTER** key.
- Step 3 Then the message is displayed.
- Step 4 Press the **ENTER** key to proceed next step.  
Then the result is displayed.
- Step 5 Press the **ESC** key several times to return to the weighing mode.

## Delete a Material Code

The parameters of the material code can be reset in the following menu.

- Total value
- Setpoint and total
- All total
- All material code

## Example of Deleting the Total Value

- Step 1 Press and hold the **ENTER** key and press the **↔** key.  
Then menu `MatEdit` blinks.
- Step 2 Press the **↔** key to select menu `Delete`. And press the **ENTER** key.
- Step 3 Select menu `Total` using the **↔** key. And press the **ENTER** key.
- Step 4 Enter the material code using the **numerical** keys and press the **ENTER** key.
- Step 5 Press the **ESC** key several times to return to the weighing mode.

## Copy a Material Code

- The parameters of material code are copied. This copy includes a total weight value and times of total.

- Step 1 Press and hold the **ENTER** key and press the **↔** key.  
Then menu `MatEdit` blinks.
- Step 2 Press the **↔** key to select menu `Copy`. And press the **ENTER** key.
- Step 4 Specify the original code number using the **numerical** keys and press the **ENTER** key.
- Step 5 Specify a duplicated code number using the **numerical** keys and press the **ENTER** key.
- Step 6 Press the **ESC** key several times to return to the weighing mode.

## Tare of a Material Code

- Use to copy a current tare to the preset tare.
- Set the preset tare function [genf-12 ] of the function list.
  - [genf-12] [0] If the preset tare of the code is zero, the last tare value is in effect.  
(factory settings)
  - [genf-12] [1] If the preset tare of the code is zero, the tare value is reset.

Step 1 Press and hold the **ENTER** key and press the **↵** key.

Then menu `MatEdit` blinks.

Step 2 Press the **↵** key to select the menu `Tare`. And press the **ENTER** key.

Step 4 Specify a code number using the **numerical** keys and press the **ENTER** key.

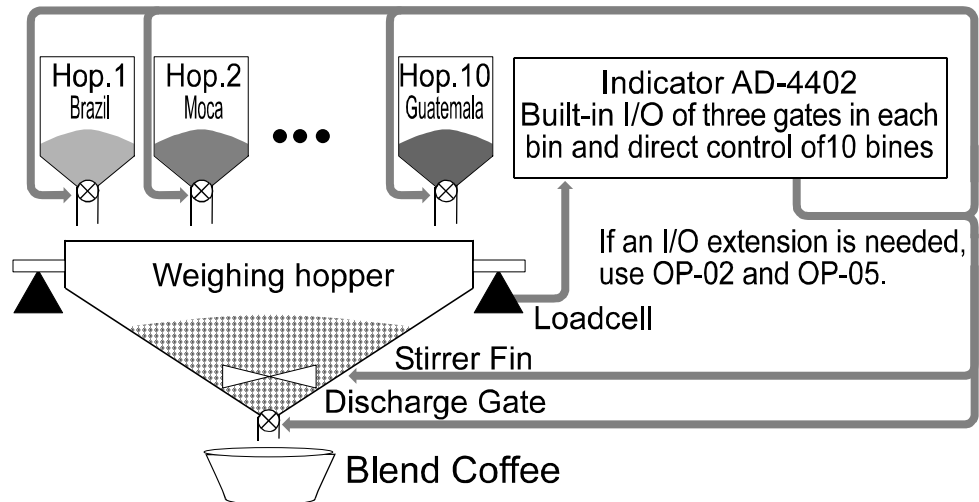
Then the current tare value is copied to preset tare.

Step 5 Press the **ESC** key several times to return to the weighing mode.

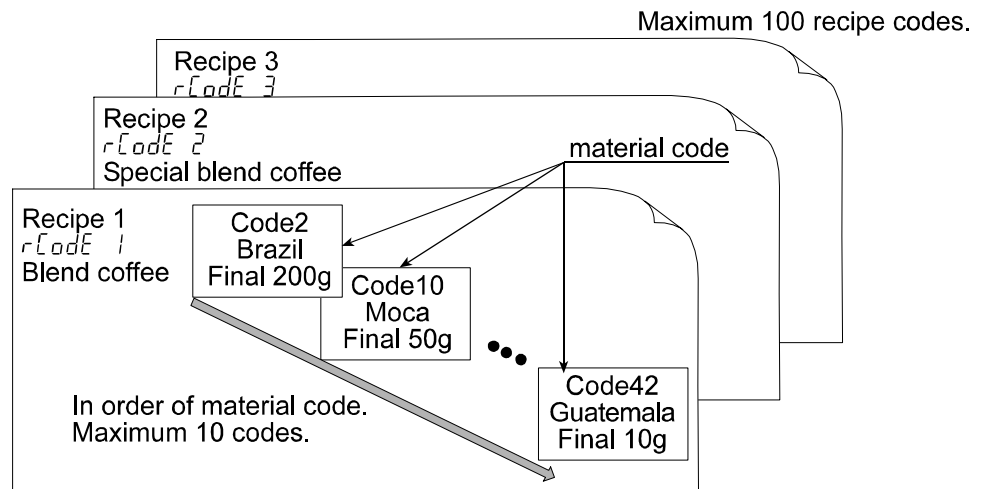


## 6.2. Simple Hopper Scale with a Recipe Code

This section explains for the recipe code. The recipe code is used on a simple hopper scale to mix several materials that have preset final values. "The simple hopper scale" means that it does not control the ratio or the a weight of ingredient, but simply totals the preset final weight of the material code. Therefore, the recipe code is used to total the preset final weight of the material code.



Example: Simple Hopper Scale



### 6.2.1. Definition of a Recipe Code

- ❑ A recipe code consists of multiple preset material codes.  
A maximum of ten material codes can be stored in a recipe code.
- ❑ A recipe code is used in order to total the final weight of the material code.
- ❑ The AD-4402 indicator can store one hundred recipe codes.
- ❑ The recipe code is necessary, to store the details before use.  
The code is called using a code number in a weighing sequence.
- ❑ The recipe code is used to total the preset final weight of the material code.  
If a recipe code is used in the batch weighing (or loss-in-weigh), you can get a weight that is the total preset final weight of the material code.
- ❑ The recipe sequence that uses a recipe code is also called a formula sequence.



## 6.2.2. Using a Recipe Code

---

- Set the menu [Function] - [Function setting] - [Sequence] - [Basic] - [Recipe mode] to sequential mode ( [5q f- 8] to [1] or [2] ), when the recipe code is used.  
[5q f- 8] [1] Semi-automatic mixing sequence  
[5q f- 8] [2] Automatic mixing sequence

## 6.2.3. Construction of a Recipe Code

---

- The AD-4402 indicator can store one hundred recipe codes.
- A recipe code can store a maximum of ten material codes in the order of accumulating them.
- These parameters are stored in backup memory even without power.
- Refer to the backup method [0tHf-11] of the function list.

### Caution

**If the flash memory is selected for memory backup [0tHf-11], the current built-in automatic program mode is stopped.**

Name	Display Symbol & Example	Memory
Recipe code	rCode	Backed up RAM ( factory setting) or flash memory
Recipe name	Bl end coffee	
Material codes of maximum ten codes. It is stored in order to accumulate them.	Code 1	
Total Weight for a recipe code	RTot 10. 00	Backed up RAM
Total Counts for a recipe code	RTot# 1000	

## 6.2.4. Recalling a Recipe Code

---

- The following steps are the explanation of how to recall the recipe code stored in the indicator. Suppose that the recipe code is used (The menu [Function] - [Function setting] - [Sequence] - [Basic] - [Recipe mode] is set to [5q f- 8] [1] or [2]). .

### Caution

**The code can be recalled during the last weighing. But the code is in effect only after the batch finish (after finishing the last weighing).**

Step 1 Press the **CODE RECALL** key.

Then the recipe code blinks.

Step 2 Enter the material code using the **numerical** keys

The details of the recipe code are displayed in the sub-display.

Step 3 Press the **ENTER** key to decide the code.

## 6.2.5. Arranging Material Code in a Recipe Code

---

- The way of arranging the material code described in a recipe code.

- Step 1 Press and hold the **ENTER** key and press the **CODE RECALL** key.
- Step 2 Select a recipe code number using the **numerical** keys and press the **ENTER** key.  
Then the first material code blinks.
- Step 3 Select a material code using the following keys.  
↵ key, the **numerical** keys and the **SHIFT** key
- Step 4 Press the **ENTER** key to store it. Then the next code blinks.
- Step 5 Continue step 3 and 4 until the last material code is stored.
- Step 6 Press the **ESC** key several times to return to the weighing mode.

## 6.2.6. Editing Full Parameters of a Recipe Code

---

All parameters of the recipe code can be edited in this menu.

### Edit the Name of a Recipe Code

- Step 1 Press and hold the **ENTER** key and press the ↵ key.  
Press the ↵ key. Then the menu *RecipeEDIT* blinks.
- Step 2 Press the **ENTER** key to edit the recipe code. Then the menu *edit* blinks.
- Step 3 Press the **ENTER** key to enter menu edit.
- Step 4 Select a recipe code using the **numerical** keys and press the **ENTER** key.
- Step 5 Name the recipe code using the **alphanumeric** keys and press the **ENTER** key.
- Step 6 If you have finished the change, press the **ESC** key several times to return to the weighing mode.

### Search of a Recipe Code

Use this menu to search for blank material code.

- Step 1 Press and hold the **ENTER** key and press the ↵ key.  
Press the ↵ key. Then the menu *RecipeEDIT* blinks.
- Step 2 Press the ↵ key to select the menu *Search*. And press the **ENTER** key.
- Step 3 Then the message is displayed.
- Step 4 Press the **ENTER** key to proceed next step.  
Then the results are displayed.
- Step 5 Press the **ESC** key to return several times to weighing mode.

### Delete of Recipe Code

The parameters of the recipe code can be reset in the following menu.

- Total value
- Recipe total value
- All total values
- All Recipes

### Example of Deleting a Total Value

- Step 1 Press and hold the **ENTER** key and press the **↔** key.  
Then the menu *RecipeEDIT* blinks.
- Step 2 Press the **↔** key to select the menu *Delete*. And press the **ENTER** key.
- Step 3 Select the menu *Total* using the **↔** key.  
And press the **ENTER** key.
- Step 4 Enter the recipe code using the **numerical** keys and press the **ENTER** key.
- Step 5 Press the **ESC** key to return several times to weighing mode.

### Copying a Recipe Code

- The parameters of a recipe code are copied. This copy includes a total weight value and times of total.
- Set the preset tare function [ genf-12 ] of the function list.  
[genf-12] [0] If the preset tare of the code is zero, the last tare value is in effect.  
(factory settings)  
[genf-12] [1] If the preset tare of the code is zero, the tare value is reset.

- Step 1 Press and hold the **ENTER** key and press the **↔** key.  
Then the menu *RecipeEDIT* blinks.
- Step 2 Press the **↔** key to select the menu *Copy*. And press the **ENTER** key.
- Step 4 Specify the code number to copy using the **numerical** keys and press the **ENTER** key.
- Step 5 Specify the code number to copy data into using the **numerical** keys and press the **ENTER** key.
- Step 6 Press the **ESC** key several times to return to weighing mode.



## 6.3. System Design of a Hopper Scale

### 6.3.1. Operation and I/O Design

In General, looking at an old type hopper scale design, the simplest indicator only displayed the weight value, other system devices communicated the control signal with each I/O interface. And the key operations and monitoring the system were controlled separately.

- The indicator AD-4402 has an I/O interface to control the system, sub-display to monitor system information, main display to display weighing data and keys to control the system, in one unit.
- The indicator is designed so as to be able to select arbitrary keys and terminals to control the system from the front panel keys and the I/O interface with the menu function. The function of keys and terminals can be designed in the same way.
- The system information of the sub-display can be selected in at the function list.

### 6.3.2. Design Example

Suppose that the I/O, keys and sub-display are as follows:

Batch start:	F1 key,	[0thf- 2] [6]
Emergency stop key:	F2 key,	[0thf- 3] [13]
Dribble signal :	terminal B1,	[0utf- 1] [6]
Batch finish signal :	terminal B2,	[0utf- 2] [14]
Not used recipe code		[5q f- 8] [0]
Use default setting for the sub-display		[5sub f 1] [0]

#### Setup

- Step 1 Enter the function list.
- Step 2 Select the menu **F1** key.([Function] - [Function setting] - [General] - [Other] - [F1 key])
- Step 3 Select [6] of Batch start for the **F1** key and store it.
- Step 4 Select [13] of Forced batch finish for the **F2** key and store it.
- Step 6 Select the menu terminal B1.  
([Function] - [Function setting] - [Control I/O Function] - [Output] - [OUT (B1)])
- Step 8 Select [6] of Dri bbl e f l o w for the terminal B1 and store it.
- Step 9 Select [14] of Batch finish for the terminal B2 and store it.
- Step 10 Set [6] of "Not used recipe code" at Reci pe mode.  
([Function] - [Function setting] - [Sequence] - [Basic] - [Recipe mode])
- Step 11 Select [0] of the default menu and store it.  
([Function] - [Function setting] - [General] - [Sub-display] - [Weighing display])
- Step 12 Press the **ESC** key several times to return to the weinging mode.

#### Operation and Response

- When the F1 key is pressed, a batch weighing is started and terminal B1 works.
- When the F2 key is pressed, batch weighing is stopped.
- When the final weight has been achieved, terminal B2 is turned on.



## 7. Weighing Mode

### 7.1.1. Contents of the Batch Weighing Mode

---

#### Batch Weighing

Normal Batching	Section 7.2
Normal Batching using Built-in Automatic Program Mode	Section 7.3.1
Normal Batching using Customer Programmed Control Mode	Section 7.4.1
Loss-in-weigh	Section 7.2
Loss-in-weigh using Built-in Automatic Program Mode	Section 7.4.1
Loss-in-weigh using Customer Programmed Control Mode	Section 7.4.2
Selection of Batch Weighing	Section 7.2.1

#### Controlled Output Signals

The type of signal output to control gates (valves) in batch weighing.

Built-in Automatic Program Mode	Section 0
Customer Programmed Control Mode (Comparison Output)	Section 7.4

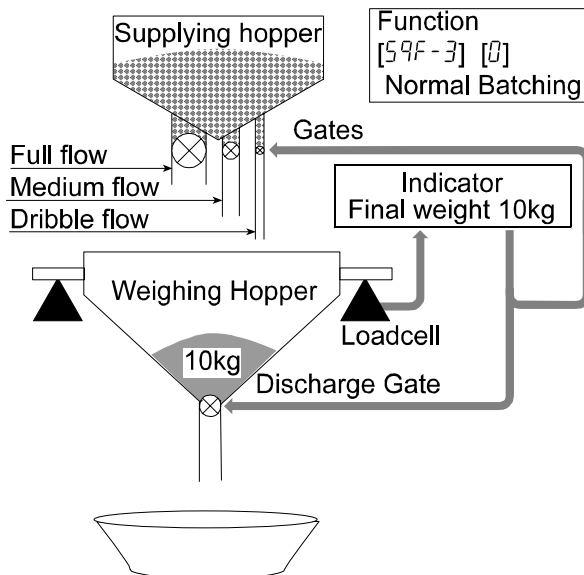
#### Partial Sequence of the Built-in Automatic Program Mode

Compensation Sequence	Section 7.3.3
Initial flow Sequence	Section 7.3.4
Discharge Sequence	Section 7.3.5
Recipe Sequence	Section 7.3.6
Automatic Selection of Supplying Hopper	Section 7.3.7
Nozzle Operation (vacuum cleaner)	Section 7.3.8
Mixing Sequence	Section 7.3.9
Safety Check Function	Section 7.3.10
Pause and Emergency Stop	Section 7.3.11
Restart Sequence	Section 7.3.12
Automatic Free Fall Compensation	Section 7.3.13
Real Time Free Fall Compensation	Section 7.3.14

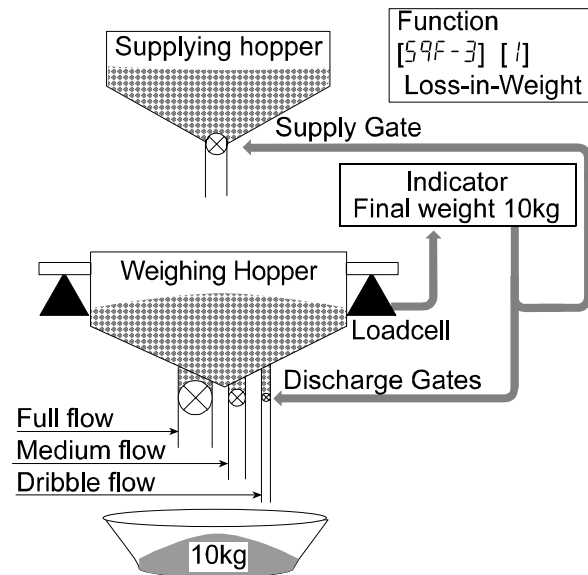


## 7.2. Batch Weighing Mode

- This mode is used to get a (constant) final weight from a supplying hopper for the hopper scale and filling machine. And mode can be classified as normal batch weighing or loss-in-weigh.
- There are two control methods of the customer programmed control and built-in automatic program mode.



Example: Normal Batching



Example: Loss-in-Weight

### Normal Batching

- Normal batch weighing weighs the material charged into the hopper.
- Control gates (valves) can be used. (Full flow, medium flow and dribble flow)

### Loss-in-weigh

- Loss-in-weigh weighs the material discharged from the hopper.
- Control gates (valves) can be used. (Full flow, medium flow and dribble flow)

### Caution

**Use PLC (programmable logic controller unit) to supply material into the weighing hopper and monitor the bulk of material in the hopper.**

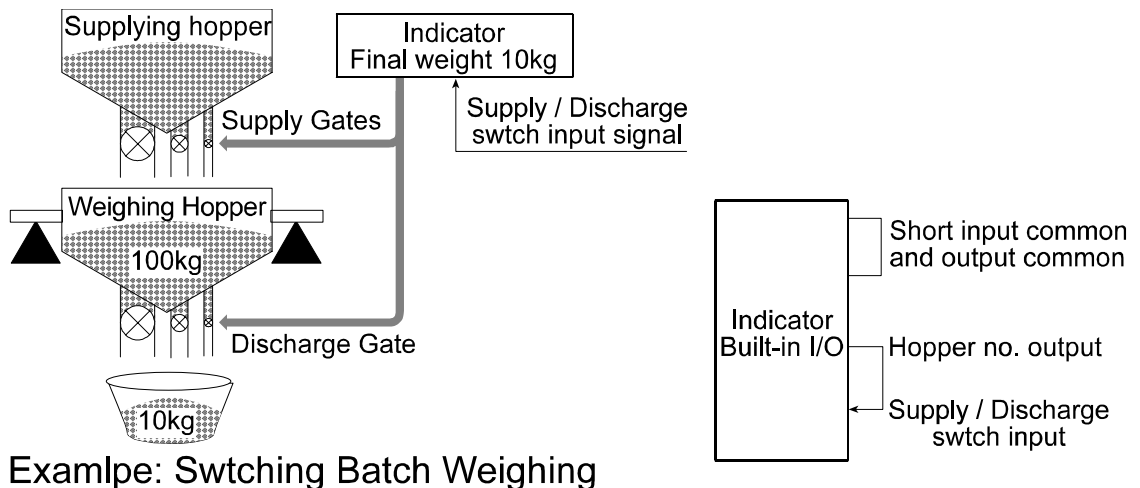
## 7.2.1. Selection of Batch Weighing

### Selection of Normal Batching or Loss-in-weigh

- The mode can be selected at **Loss-in-weigh** in the Function list.  
([Function] - [Function setting] - [Sequence] - [Basic] - [Current weighing])
  - [5q f- 3] [0] Normal batch weighing
  - [5q f- 3] [1] Loss-in-weigh
  - [5q f- 3] [2] External selection (Normal batch weighing or Loss-in-weigh)

### External Selection (Normal batch weighing or Loss-in-weigh)

- Normal batch weighing and Loss-in-weigh can be selected by a signal at the input terminal that is set to [9] of **External switch control**.  
(The menu [Function] - [Function setting] - [Control I/O Function] - [Input])
- Example of use: 100 kg of material is supplied to the hopper in the first step. It is subdivided into material of 10 kg.



### Advise

If the mode is switched concerning a specified material only, set the hopper no. in the material code, short the hopper no. output line and the supply/discharge switch input line. Set the delay timer [5q f-32] to "above 0.1sec."

[ Blank page]





## 7.3. Built-in Automatic Program Mode

- The built-in automatic program mode directly outputs control signals (example: medium flow valve, batch finish) without a PLC.
- The built-in automatic program mode can include several partial sequences like an initial flow sequence, mixing sequence etc. into basic built-in automatic program mode.
- The power of the control I/O signal output is too small to drive a large valve directly. Use option relay output ( OP-02 ) to drive them.
- If the number of control I/O terminals is not enough, use parallel option I/O ( OP-05 ).

### Forecast Control Function

- This function forecasts a timing to close the dribble flow (valve) and realizes more precise weighing. The forecast method calculates the weighing value at some points between sampling data and compares it with the dribble setpoint. The effect is equivalent to using a high speed A/D converter. The sampling rate of this indicator is 100 [times/second]. But the ratio is equivalent to 1000 [times/second], when this function is used.

### Caution

- **If multiple supplying hopper is used (the recipe code is used), this mode can not be used.**  
**Related section " 7.3.7. Automatic Selection of Supplying Hopper".**
- **Use a high speed high, precision valve like a direct voltage solenoid valve.**
- **Design the mechanical valve so as to minimize the delay time.**

## 7.3.1. Normal Batching of Built-in automatic program mode

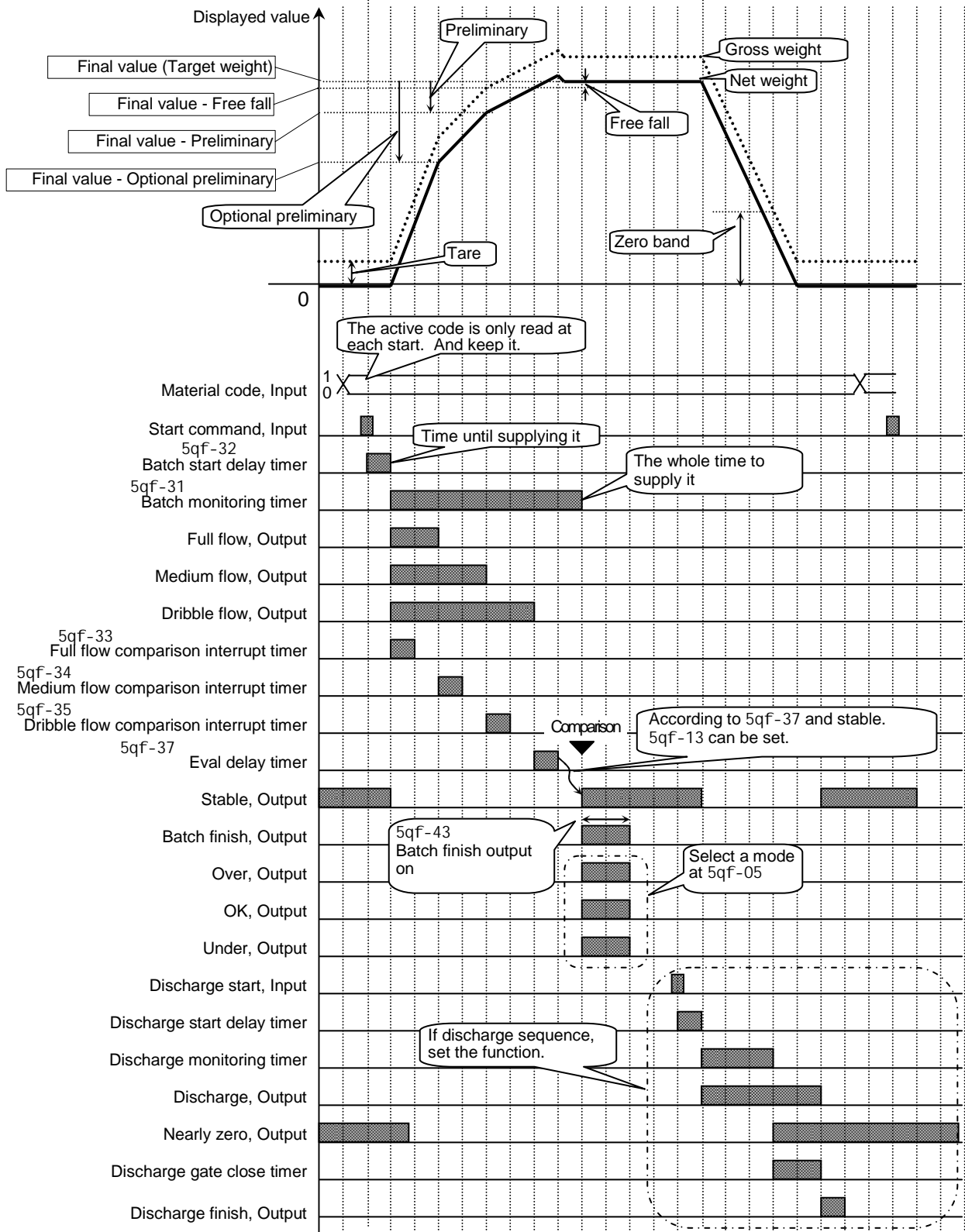
---

- Normal batch weighing weighs the material charged into the hopper.
- Control gates (valves) can be used. (Full flow, medium flow and dribble flow)

### Concerning Parameters of the Function

- Selecting normal batching of built-in automatic program mode.
  - [5q f- 1] [2] Built-in automatic program mode  
[Function] - [Function setting] - [Sequence] - [Basic] - [Weighing mode]
  - [5q f- 3] [0] Normal batch weighing  
[Function] - [Function setting] - [Sequence] - [Basic] - [Loss-in-weigh]
- Setting the display to automatically when starting the sequence.
  - [5q f-11] [Function] - [Function setting] - [Sequence] - [Control] - [Batch start settings]
- Preventing vibration due to gate operation.
  - [5q f-33] [Function] - [Function setting] - [Sequence] - [Timer] - [Full flow comparison interrupt timer]
  - [5q f-34] [Function] - [Function setting] - [Sequence] - [Timer] - [Medium flow comparison interrupt timer]
  - [5q f-35] [Function] - [Function setting] - [Sequence] - [Timer] - [Dribble flow comparison interrupt timer]
- Sending an alarm signal when the sequence time over is.
  - [5q f-31] Maximum weighing time between start and batch finish can be set. Error code [SQ. ERR 4] is displayed, when an error occurs.  
[Function] - [Function setting] - [Sequence] - [Timer] - [Batch monitoring timer]
- Removing "stable" from comparison condition.
  - [5q f-13] [Function] - [Function setting] - [Sequence] - [Control] - [Eval condition]
- Changing the timing of comparison.
  - [5q f-37] [Function] - [Function setting] - [Sequence] - [Timer] - [Eval delay timer]
- Changing accuracy of comparison.
  - [5q f-48] The time to average displayed value at batch finish can be set. The timing of batch finish delays for the time.  
[Function] - [Function setting] - [Sequence] - [Timer] - [Average Eval time]
- Changing the pulse width of batch finish output.
  - [5q f-43] If zero is set to this, the output remains until next start signal.  
[Function] - [Function setting] - [Sequence] - [Timer] - [Batch finish output on]
- Mixing at batch finish.
  - [5q f-14] [Function] - [Function setting] - [Sequence] - [Control] - [Batch finish action]
- Discharging at batch finish.
  - [5q f-15] [Function] - [Function setting] - [Sequence] - [Control] - [Discharge finish action]

- Using customer programmed control for OVER signal, OK signal and UNDER signal.  
[5q f- 5] [Function] - [Function setting] - [Sequence] - [Basic] - [Comparison]



Drawing: Normal Batching of Built-in automatic program mode

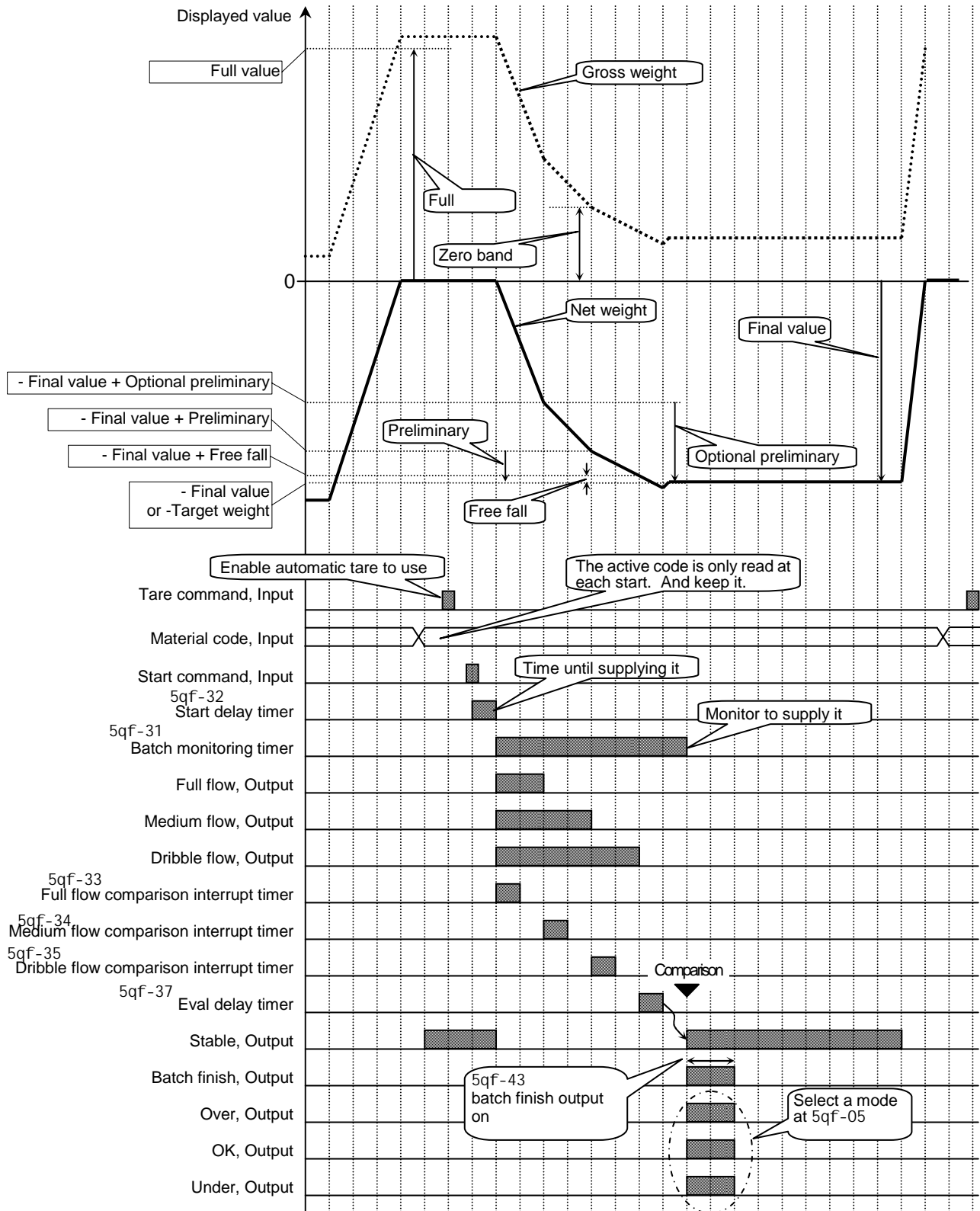
## 7.3.2. Loss-in-weigh of the Sequential Mode

---

- Loss-in-weigh weighs the material discharged from the hopper.
- Control gates (valves) can be used. (Full flow, medium flow and dribble flow)

### Concerning Parameters of the Function

- Selecting normal batching of built-in automatic program mode.
  - [5q f- 1] [1] Built-in automatic program mode  
[Function] - [Function setting] - [Sequence] - [Basic] - [Weighing mode]
  - [5q f- 3] [0] Normal batch weighing  
[Function] - [Function setting] - [Sequence] - [Basic] - [Loss-in-weigh]
- Setting the display to zero automatically when starting the sequence.
  - [5q f-11] [Function] - [Function setting] - [Sequence] - [Control] - [Batch start settings]
- Switching normal batching and loss-in-weigh from the I/O interface.
  - [5q f- 3] [2] External exchange  
Set an input terminal to switch the mode at the I/O interface. Material can be supplied to the hopper with three gates (valves).  
[Function] - [Function setting] - [Sequence] - [Basic] - [Loss-in-weigh]
- Checking whether is there enough remaining weight for one batch weighing.
  - [5q f-55] [1] When the remaining weight is under the final weight + zero band, the signal "zero band" is output.  
[Function] - [Function setting] - [Sequence] - [Setpoint (Compared value)] - [Add final value and zero band]
  - [5q f-56] [1] If this is set, when the hopper is filled fully, the signal "Full" is output.  
[Function] - [Function setting] - [Sequence] - [Setpoint (Compared value)] - [Add final value and full value]



Drawing: Loss-in-weigh of Built-in automatic program mode

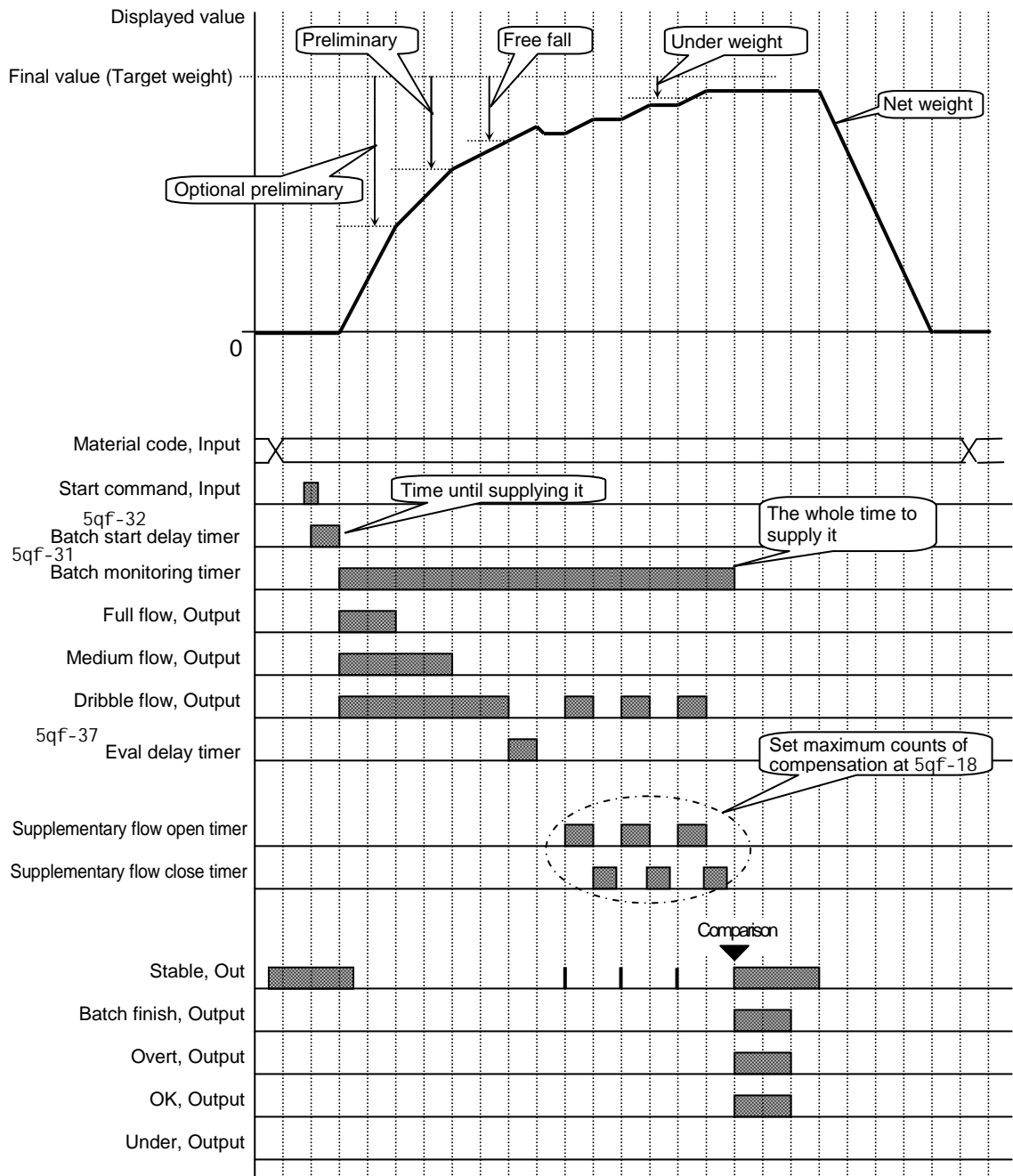
### 7.3.3. Compensation Sequence

---

- The compensation sequence is used to make up (add) the material automatically, when the result of the current batch weighing is under weight.

#### Concerning Parameters of the Function

- Storing a maximum repeat count of the compensation sequence.  
[5q f-18] If number is zero, this sequence is canceled. When the result is under weight after the sequence, An error SQ. ERR 2 is displayed.  
[Function] - [Function setting] - [Sequence] - [Control] - [Maximum number of compensation]
- Setting the time to open the dribble gate.  
Set the time for each material code.  
[Function] - [Function setting] - [MatEDIT] - [Edit] - [SF flow open timer]
- Setting the time to close the dribble gate.  
Set the time for each material code.  
When the displayed value is stable and under weight, the compensation is repeated. Take a longer time closing the gate, if it does not use a stable signal.  
[Function] - [Function setting] - [MatEDIT] - [Edit.] - [SF flow close timer]
- Removing the nozzle at this sequence, when the nozzle operation is used.  
[5q f-12] [2] Nozzle contact stop sequence  
Factory setting is "not used". When it is necessary to shift up the nozzle to reduce a weighing error, use this parameter of [5q f-12].  
[Function] - [Function setting] - [Sequence] - [Control] - [Nozzle control]



Drawing: Compensation Sequence

## 7.3.4. Initial Flow Sequence

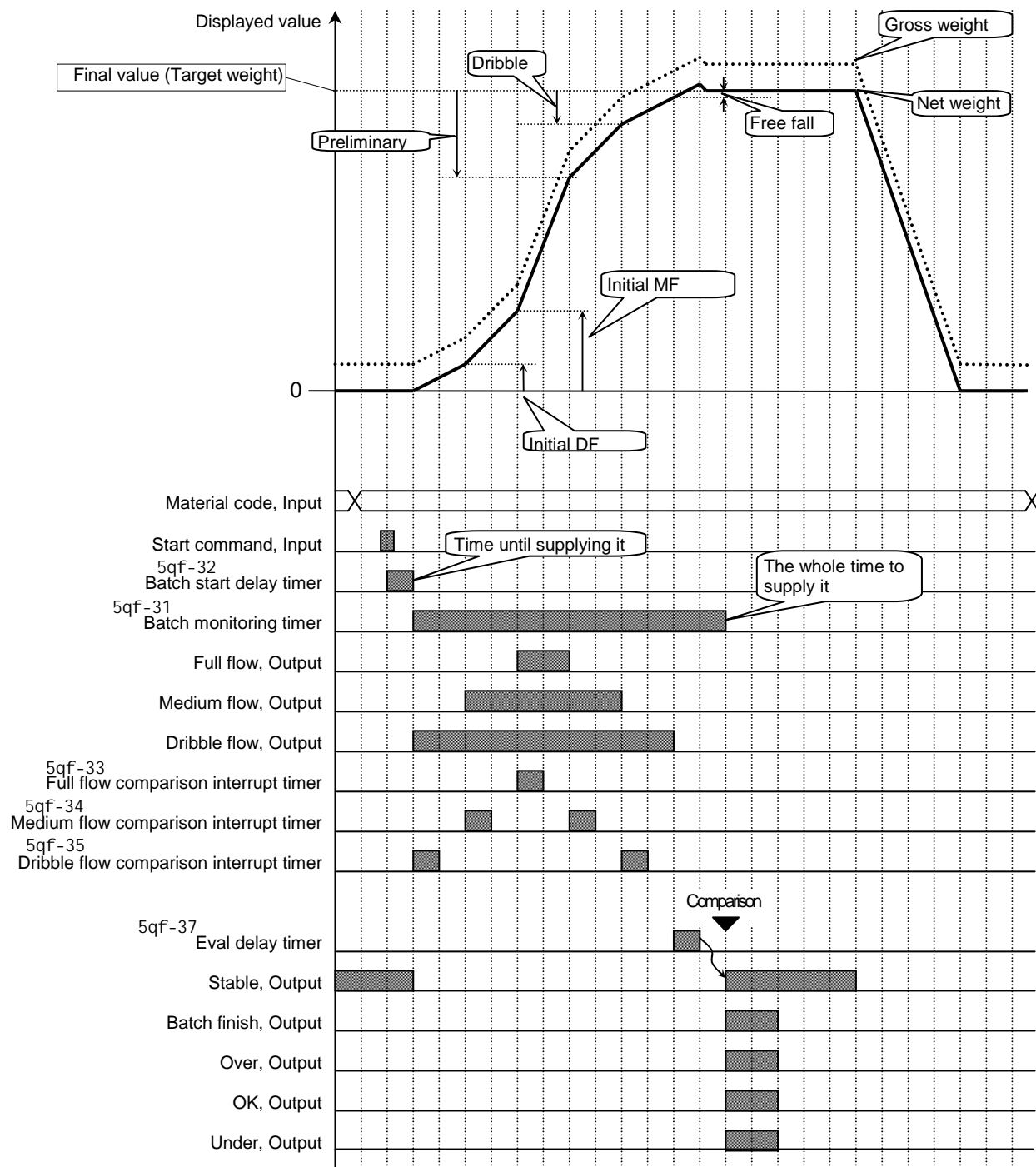
---

- The initial flow sequence is used to prevent the material from scattering before the batch weighing when a liquid or powder is weighed. When the sequence starts, the dribble gate is opened first, the medium gate is opened next and the full gate is opened last. The parameter can be set in each material code.

### Concerning Parameters of the Function

- Using this sequence to prevent the material from scattering.
  - Set the following parameters in each material code.
    - I n i t i a l   D F (Initial dribble flow)
    - I n i t i a l   M F (Initial medium flow)
- Editing these parameters.
  - Edit the parameters in the function mode.
  - [Function] - [Function setting] - [MatEDIT] - [Edit]
- Inhibiting comparison during the sequence.
  - [5q f-35]      Store the time of the dribble flow comparison inhibit timer.  
[Function] - [Function setting] - [Sequence] - [Timer] - [Dribble flow comparison interrupt timer]
  - [5q f-34]      Store the time of the medium flow comparison inhibit timer.  
[Function] - [Function setting] - [Sequence] - [Timer] - [Medium flow comparison interrupt timer]





Drawing: Initial Flow Sequence

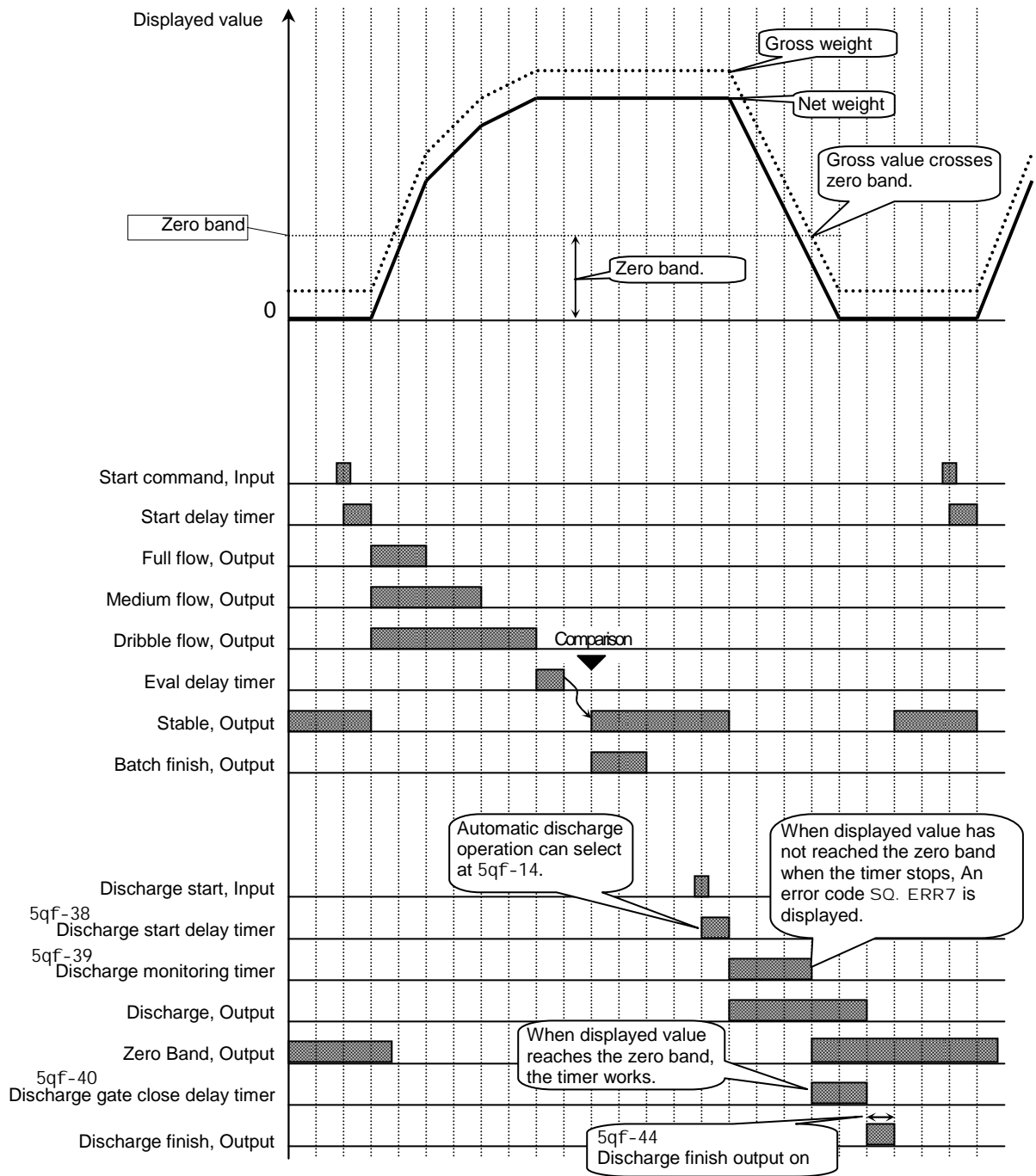
## 7.3.5. Discharge Sequence

---

- The discharge sequence is used to discharge the material from the hopper and clear the hopper after finishing a batch weighing.

### Concerning Parameters of the Function

- Storing the time between receiving a start command and opening the discharge gate.  
[5q f-38] [Function] - [Function setting] - [Sequence] - [Timer] - [Discharge start delay timer]
- Using the alarm for the discharge time limit.  
[5q f-39] If it is over, an error SQ. ERR 7 is displayed.  
[Function] - [Function setting] - [Sequence] - [Timer] - [Discharge monitoring timer]
- Storing the time between cleared hopper and closing the gate.  
[5q f-40] [Function] - [Function setting] - [Sequence] - [Timer] - [Discharge gate close delay timer]
- Discharging it automatically when the weighing is finished.  
[5q f-14] When the finish signal is turned off, the discharge start timer starts.  
[Function] - [Function setting] - [Sequence] - [Control] - [Batch finish action]
- Discharging it automatically when the mixing weighing is finished.  
[5q f-17] When the finish signal is turned off, the discharge start timer starts.  
[Function] - [Function setting] - [Sequence] - [Control] - [Recipe finish action]



Drawing: Discharge Sequence

## 7.3.6. Recipe Sequence

---

- The recipe sequence mixes preset final weights of multiple materials that are stored in a recipe code. One hundred recipe codes can be stored in the indicator. A recipe code can store ten material codes and the order to mix them.
- There are the following two modes that can be selected at *Recipe mode*.
  - Semi-automatic [5qf- 8] [1] The mode that uses (external) start commands for each material.
  - Automatic [5qf- 8] [2] The mode that does not need each start command. When an under weight occurs in a material, an error code SQ. ERR 2 is displayed and the sequence stops.

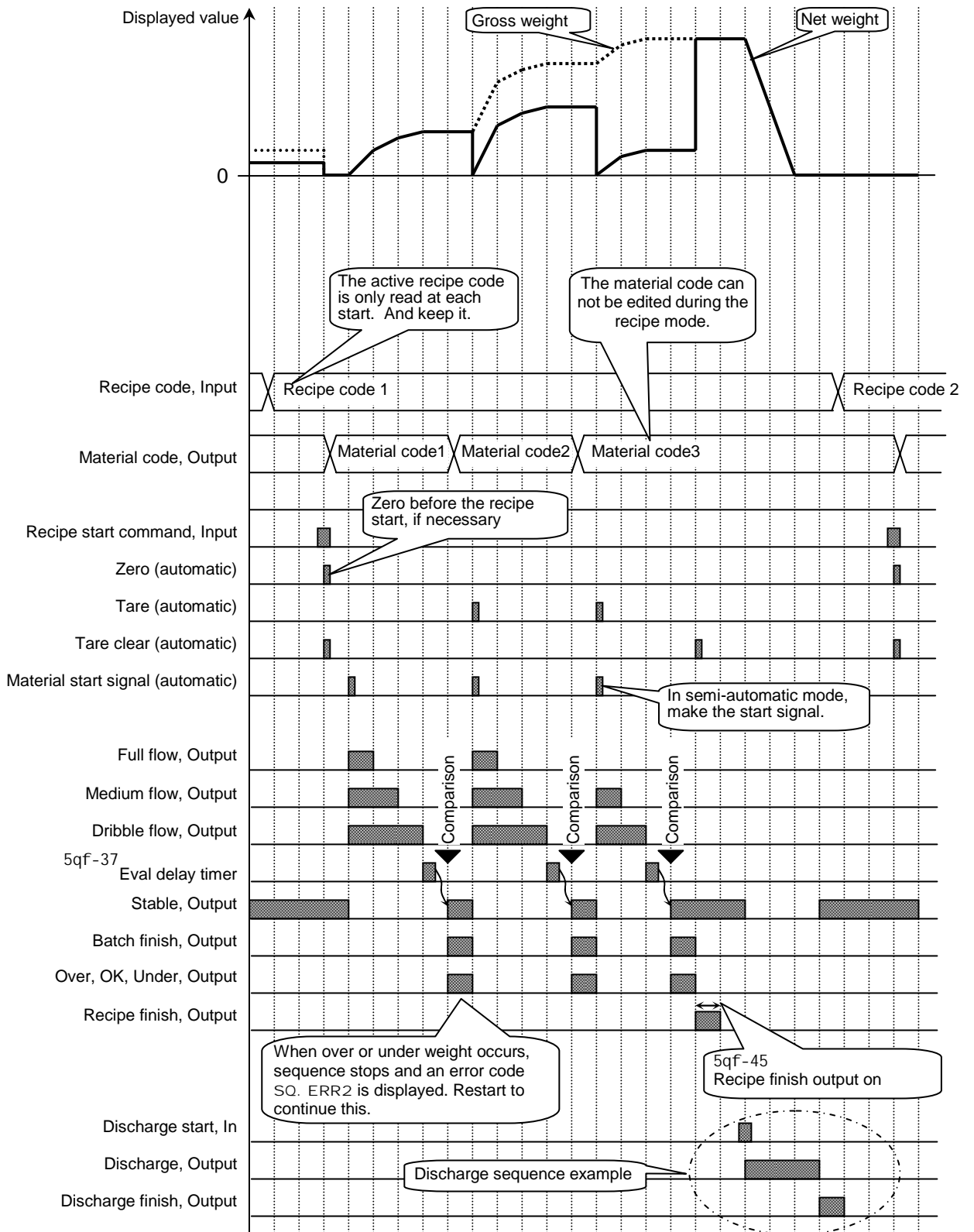
### Concerning Parameters of the Function

- Selecting normal batching of built-in automatic program mode.
  - [5q f- 8] *Recipe mode*
  - [5q f- 8] [1] *Semi-automatic mode, or*
  - [5q f- 8] [2] *Automatic mode*[Function] - [Function setting] - [Sequence] - [Basic] - [Recipe mode]
- Setting the display to zero automatically when starting the recipe sequence.
  - [5q f-16] [Function] - [Function setting] - [Sequence] - [Control] - [Recipe start action]
- Clearing tare values, mixing them and discharging them when finishing the recipe sequence.
  - [5q f- 17] [Function] - [Function setting] - [Sequence] - [Control] - [Recipe finish action]
- Changing the width of the finish signal output of the recipe sequence.
  - [5q f-45] [Function] - [Function setting] - [Sequence] - [Timer] - [Recipe finish output on]
- Calculating totals in each recipe code.
  - [5q f-62] [Function] - [Function setting] - [Sequence] - [Total] - [Automatic recipe code total]

### Weighing a single material code during a recipe sequence

When it is necessary to weigh the material code temporarily during a recipe sequence, use recipe prohibition command of the external I/O or OP-05. When the prohibition works, the material code can be used and total of the recipe is not total.

- Setting of the I/O.
  - [1n f-nn] [49] Recipe interrupt (Prohibition of recipe sequence)  
nn: terminal number of I/O.  
[Function] - [Function setting] - [Control I/O] - [Input]



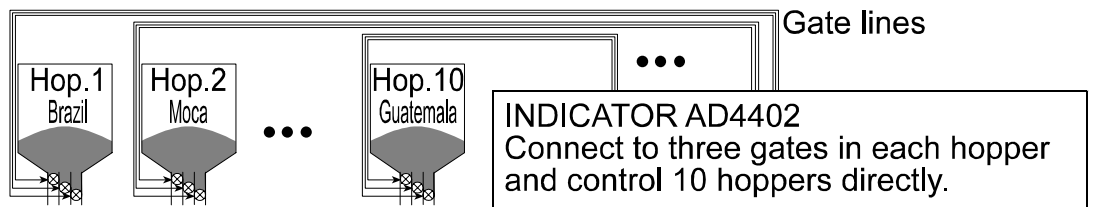
Drawing: Recipe Sequence

## 7.3.7. Automatic Selection of Supplying Hopper

- When there are multiple supplying mats of materials, the indicator has to control these gates. There are the following two method to control them.

### Case 1: Direct Gate Control

- The method that connects the gate control lines of supplying hoppers to the I/O terminals of the indicator and the indicator directly controls them.
- Three kinds of gates can be used in a supplying hopper. (Full, medium, dribble gate)
- Number of supplying hopper: **Ten hoppers** can be used.
- Preset material codes and recipe codes can be used.
- The selection of the supplying hopper is [MatEDIT] - [Material code] - [Material hopper].  
The selection of the I/O terminals is [Function] - [Function setting] - [Control I/O Function] - [Output].
- Even if a code is recalled during the sequence, the code does not work until the sequence finishes.
- When the number of I/O terminals is not enough, use relay output option (OP-02) and parallel I/O (OP-05).



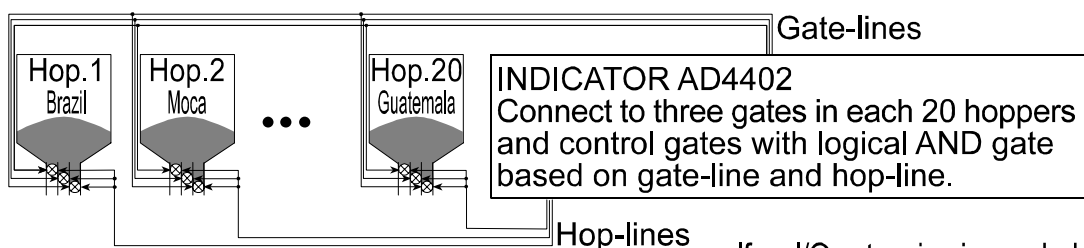
Example: Direct Gate Control

If an I/O extension is needed, use OP-02 and OP-05.

### Case 2: Gate Control with Supplying Hopper Selection

The method:

- Make **gate-lines** that gates of a kind, in each supplying hopper are connected to the I/O terminal of the indicator in parallel.
- Make **hop-lines** that lines identified by each hopper are connected to the I/O terminal.
- The indicator can control any gate which the gate-line and hop-line are active. (logical AND gate)
- Three kinds of gates can be used in a supplying hopper. (Full, medium, dribble gate)
- Number of supplying hopper: **Twenty hoppers** can be used.
- Preset material codes and recipe codes can be used.
- The selection of the supplying hopper is [MatEDIT] - [Material code] - [Material hopper].  
The selection of the I/O terminals is [Function] - [Function setting] - [Control I/O function] - [Output].
- When number of I/O terminals is not enough, use relay output options (OP-02) and parallel I/O (OP-05).



Example: AND Gate Control

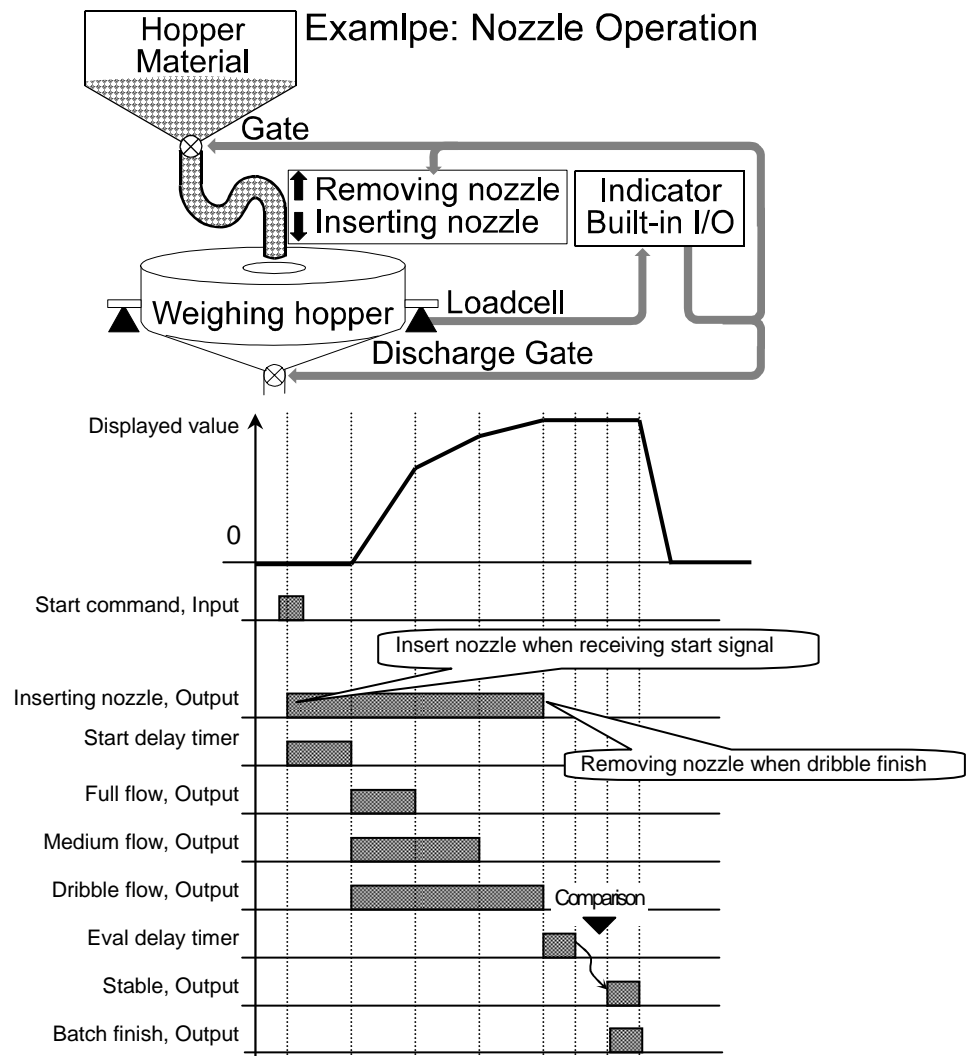
If an I/O extension is needed, use OP-02 and OP-05.

## 7.3.8. Nozzle Control Sequence (vacuum cleaner)

- The nozzle is used for filling a bottle with a liquid or powder. The procedure inserts the nozzle into the bottle automatically using the signal "nozzle down" before the weighing, weighs it and removes the nozzle when dribble flow is finished. Therefore, the result (comparison) of weighing is not affected.

### Advise

- In case of using the nozzle control sequence  
[5q f-12] [Function] - [Function setting] - [Sequence] - [Control] - [Nozzle control]
- In case of using the timer to ready nozzle.  
[5q f-32] [Function] - [Function setting] - [Sequence] - [Timer - [Batch start delay timer]
- In case of using the nozzle down  
[Outf-nn] Nozzle down  
nn: terminal number of the I/O.  
[Function] - [Function setting] - [Control I/O] - [Output]
- In case of compare it after shifting up nozzle  
[5q f-12] [Function] - [Function setting] - [Sequence] - [Control] - [Nozzle control]



## 7.3.9. Mixing Sequence

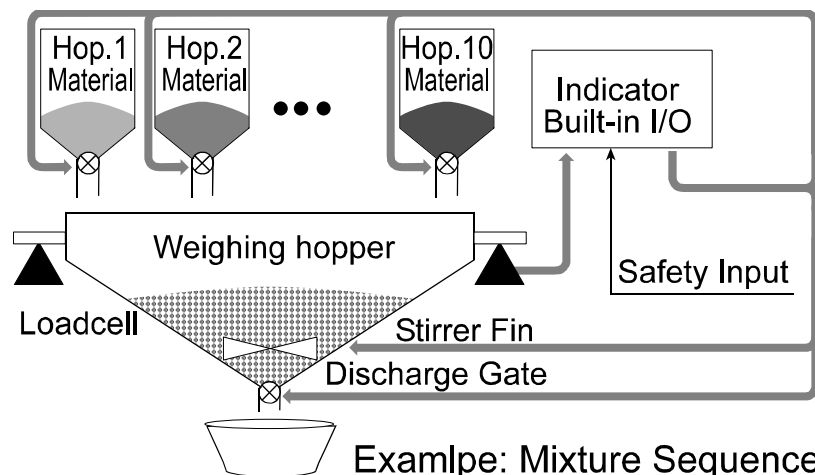
- The mixing sequence is used to mix or stir material. The signal is output from the I/O terminal set to mixing. The timing of batch finish, discharge finish and recipe finish can be selected.

### Concerning Parameters of the Function

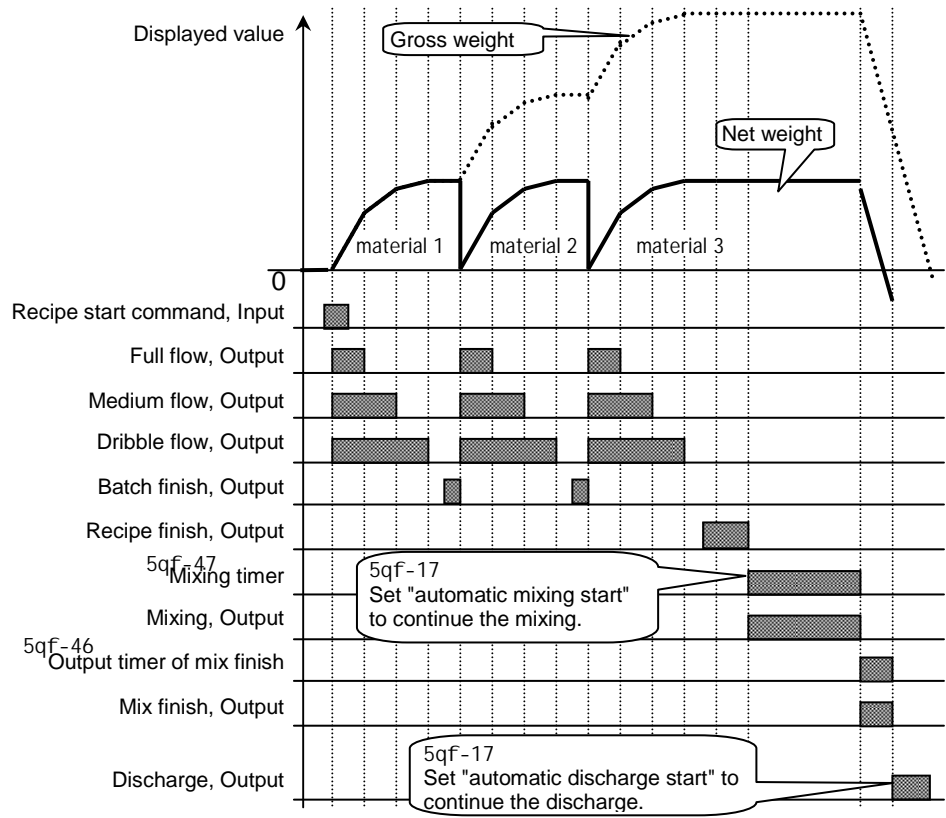
- Using the mixing sequence  
[Outf-nn] [12] Mi xi ng  
nn: terminal number of the I/O.  
[Function] - [Function setting] - [Control I/O] - [Output]  
Relay output (OP-02), parallel I/O (OP-05) can be used.
- Mixing material at batch finish  
[5q f-14] [Function] - [Function setting] - [Sequence] - [Control] - [Batch finish action]
- Mixing material after discharge  
[5q f-15] [Function] - [Function setting] - [Sequence] - [Control] - [Discharge finish action]
- Mixing material at recipe finish  
[5q f-17] [Function] - [Function setting] - [Sequence] - [Control] - [Recipe finish action]
- Storing the time of mixing  
[5q f-47] [Function] - [Function setting] - [Sequence] - [Timer] - [Mixing time output on]
- Safety check during mixing  
[5q f-74] [Function] - [Function setting] - [Sequence] - [Safety] - [Mixing safety check]

### Advise

- Safety check during mixing  
When the specified input terminals at [5q f-74] are all ON, it supposes that the sequence is safe and is continued. If any terminal is OFF, an error code is output and sequence is stopped.



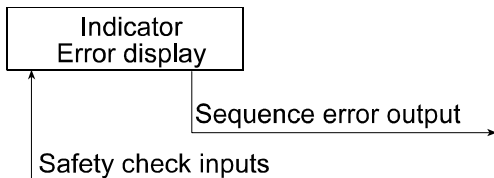




## 7.3.10. Safety Check Function

- This function is used to stop the sequence when an error or an emergency happens.
- When the function works, an error code is displayed and an error signal is output from the preset I/O terminal that wei ghi ng sequence error [22] is selected at [Function] - [Function setting] - [Control I/O] - [Output].
- The control inputs of the function, use the preset I/O terminals or OP-05 terminals that select safety check.
- In maximum, eight input terminals can be used.
- The safety check functions are as follows:

Code	Classification	Action
5qf-71	Condition of the start	Specify the safety confirmation inputs on the I/O or OP-05. When all inputs are not ON (active), the sequence is stopped, an error code is displayed.
5qf-72	Condition of the discharge	
5qf-73	Condition of the recipe (compound)	
5qf-74	Condition of the mix	
5qf-75	Condition of the whole sequence	



Example: Safety check

## 7.3.11. Pause and Emergency Stop

- The pause input is used to stop the sequence temporarily. When the sequence pauses, SQ. ERR 0 is displayed and an error code is output.
- The emergency stop input is used to stop the sequence. When the sequence is stopped, alarm1 is informed and No. al arm 19 is displayed. When the emergency stop is canceled, the status moves to the pause (temporary stop).
- Refer to section "7.5.11.Error Message and Alarm" for the details.
- The I/O terminal and OP-05 terminal can be assigned to the pause input and emergency input.

### Concerning Parameters of the Function

- Selecting the I/O terminal as the pause input or the emergency input.
  - [1n f-nn] [22] Pause (Temporary stop)
  - [1n f-nn] [13] Emergency Stop
  - nn: terminal number of I/O.
  - [Function] - [Function setting] - [Control I/O Function] - [Input]
- Selecting the OP-05 terminal as the pause input or the emergency input.
  - [05 f-nn] [22] Pause (Temporary stop)
  - [05 f-nn] [13] Emergency Stop
  - nn: terminal number of I/O.
  - [Function] - [Function setting] - [slot kk]
  - kk: The slot number that OP-05 is installed in.

## 7.3.12. Restart Sequences from Pause

---

- The restart input was used to start from the point that is stopped in the last sequence.
- The control inputs of the function use the preset I/O terminals or OP-05 terminals that select `Restart`.
- The action of the function is as follows:

When it stopped	Before the restart	Action of the restart
During initial dribble flow	All gates are closed	Start from initial dribble flow
During initial medium flow		Start from initial medium flow
During full flow		Start from medium flow
During medium flow		Start from dribble flow
During dribble flow		Start from dribble flow
Waiting batch finish signal		Waiting batch finish signal
During compensation		Start from compensation
During nozzle operation	Stopping the operation	Start from nozzle operation
During mixing	Stopping the mixing	Start from the mixing
During discharge	Stopping discharge	Start from discharge
During recipe sequence	According to above list	According to above list

## 7.3.13. Automatic Free Fall Compensation

---

- This function arranges the free fall parameter using the average of the last four displayed values so as to get a more precise weighing.

### Concerning Parameters of the Function

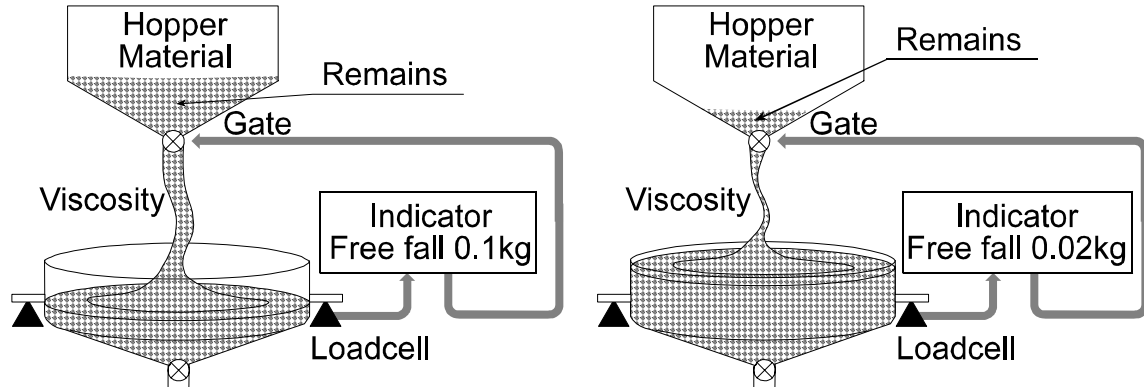
- Using the automatic free fall compensation  
[5q f-20] [1] Average of last 4 FFall s (free falls)  
[Function] - [Function setting] - [Sequence] - [Control] - [Free fall compensation]
- Using the automatic free fall effective bandwidth  
[Function] - [Function setting] - [MatEDIT] - [Code No.] - [AFFC range]  
Refer to section 6.1.5.Editing Full Parameters of Material Code.
- Using the manual free fall  
[5q f-20] [0] No (Not used)  
When using the signal from the I/O terminal to control free fall, use this.  
[Function] - [Function setting] - [Sequence] - [Control] - [Free fall compensation]
- Storing the results of the automatic free fall compensation of each material.  
[5q f- 9] [1] Change FFall  
When using the flash memory, set to [0tHf-11] [2].  
[Function] - [Function setting] - [Sequence] - [Basic] - [Material code, free fall value]

### Advise

- When the automatic free fall compensation can not work.
  - Check the flux of dribble flow.  
When the error (| result - final value |) of displayed value is greater than this parameter, the function does not work.
  - Check that the dribble flow timer is too short.  
When the timer is shorter than DFI ow auto-FFall override [5q f-36], the function does not work.
- When the accuracy does not improve, even if automatic free fall compensation is used.
  - Check the stability of the dribble flow.  
When the dribble flow is unstable and the dribble flow timer is shorter, the function can not work correctly.
- When the result becomes over, even if automatic free fall compensation is used.
  - Remove between preliminary and free fall  
When the value of preliminary and free fall are near, medium flow only works to reach the final value and the dribble flow can not work.

## 7.3.14. Real Time Free Fall Compensation

- This function arranges the free fall parameter to get more precise weighing during the sequence (in real-time calculation).  
Example: this function fits a liquid weighing (water, cement, tar) that flow rate is not constant due to temperature, viscosity and the remains.



Example: Real Time Free Fall Compensation

### Concerning Parameters of the Function

- Using the real time free fall compensation.  
[5q f-20] [2] Real time FFall compensation  
[Function] - [Function setting] - [Sequence] - [Control] - [Free fall compensation]
- Using the automatic free fall effective bandwidth  
[Function] - [Function setting] - [MatEDIT] - [Code No.] - [AFFC range]  
Refer to section 6.1.5.Editing Full Parameters of Material Code.
- Storing the results of the automatic free fall compensation of each material.  
[5q f- 9] [1] Change FFall  
When using the flash memory, set to [0tHF-11] [2].  
[Function] - [Function setting] - [Sequence] - [Basic] - [Memory of free fall value by material code]

### Advise

- When the accuracy does not improve, even if automatic free fall compensation is used.
- Check the stability of the dribble flow.  
If the material includes big lumps, when the dribble flow is unstable and irregular and when dribble flow timer is too short, this function can not work correctly.
- When the dribble flow timer is shorter than the DFlow auto-FFall override [5q f-36].  
When the timer used the default value of each material code.

[ Blank page]



## 7.4. Customer Programmed Control (Comparison Output)

- The "customer programmed control mode" simply outputs the comparison results of the setpoints and the displayed value.  
The setpoint : A preset standard value to compare with the displayed value.
- The comparison and output of the results are performed at each sampling time.
- If this function is used, a PLC (programmable logic controller unit) is needed for batch weighing on a hopper scale.
- The power of the control I/O signal output is too small to drive a large valve directly. Use relay output option ( OP-02 ) to drive them.
- If the number of control I/O terminals is not enough, use the parallel I/O option ( OP-05 ).

### Caution

- **Initial flow sequence and compensation sequence can not be used in the "customer programmed control"**

### Advise

- Automatic free fall compensation and Total function  
If the start key is used, in the same as sequential mode, when three gates are closed, the Eval timer has worked and the displayed value becomes stable, the batch finish signal can be output.
- The start key is not necessary to compare displayed values basically.

## 7.4.1. Normal Batching of the Customer Programmed Control Mode

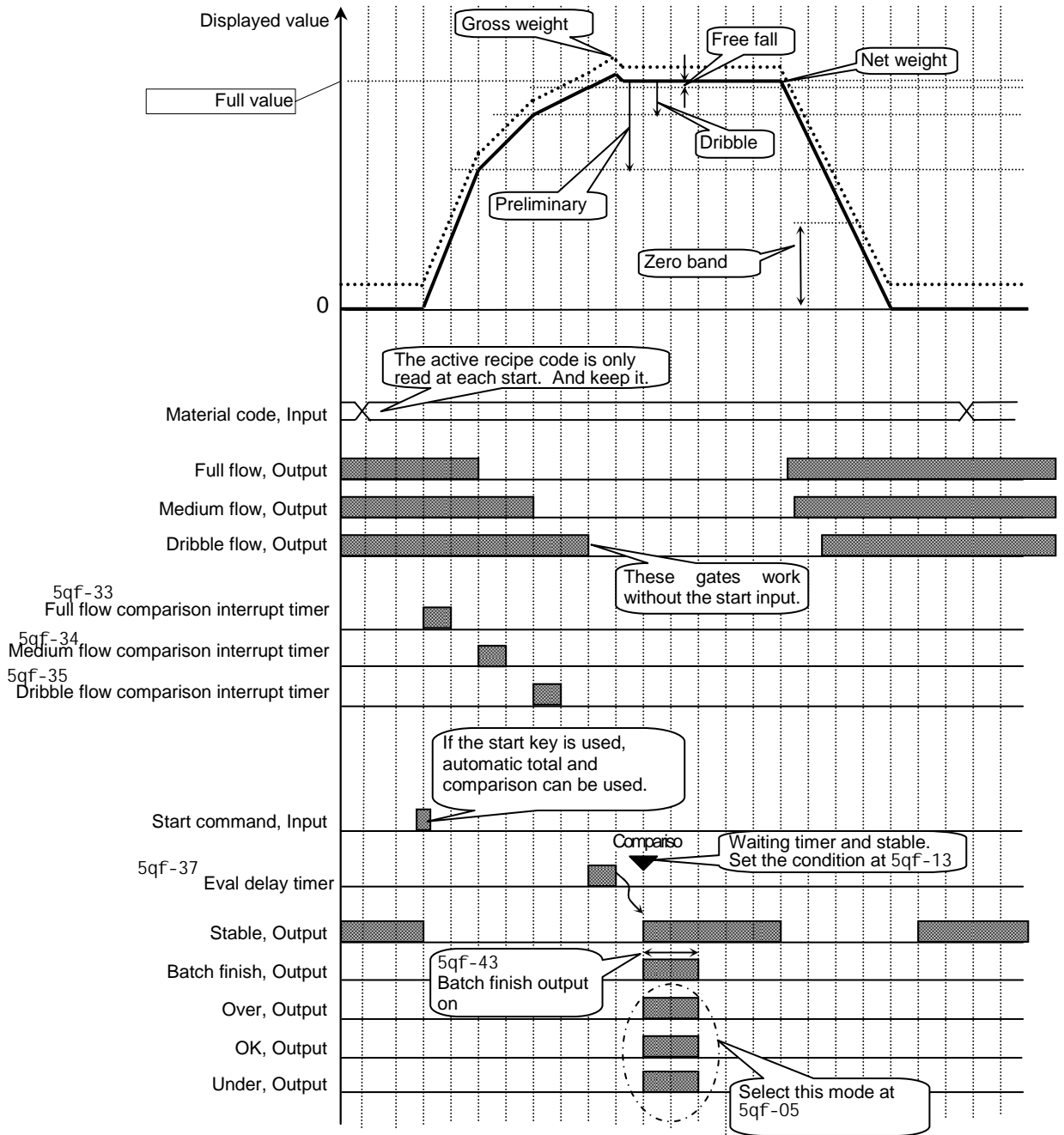
---

- This function outputs gate control signals that are derived from the compared setpoint and weighing data of the materials totaled in the hopper.
- When the weight increases above the setpoint, the gate control signal turns off. When the weight decreases under the setpoint, the gate control signal turns on.
- The weighing mode in this function is bi-directional. Therefore, the comparison is repeatable (reversible).

### Concerning Parameters of the Function

- Using normal batching of the comparison function  
[5qf- 1] [1] Customer programmed control  
[5qf- 3] [0] Normal batch weighing  
[Function] - [Function setting] - [Sequence] - [Basic]
- Changing waiting time of judgment  
[5qf-37] Eval delay timer  
[Function] - [Function setting] - [Sequence] - [Timer]
- Changing the pulse width of batch finish output  
[5qf-43] Batch finish output on  
An arbitrary width can be set.  
If zero is set, the output is kept until the next start.  
[Function] - [Function setting] - [Sequence] - [Timer]
- Using signals of "over", "OK" and "under" in the comparison function.  
[5qf- 5] Comparison  
[Function] - [Function setting] - [Sequence] - [Basic]
- Changing the accuracy of the comparison  
[5qf-48] Averaging Eval time  
The average time of batch finish output is set. The output of batch finish is delayed by the average time.  
[Function] - [Function setting] - [Sequence] - [Timer]
- Using manual free fall compensation  
[1n f-nn] [10] Manual free fall compensation  
[05 f-nn] [10] Manual free fall compensation  
nn: terminal number of the I/O.  
The input to control free fall by an external PLC.  
[Function] - [Function setting] - [Control I/O] - [Input]





Drawing: Normal Batching of Comparison Function

## 7.4.2. Loss-in-weigh of the Customer Programmed Control Mode

---

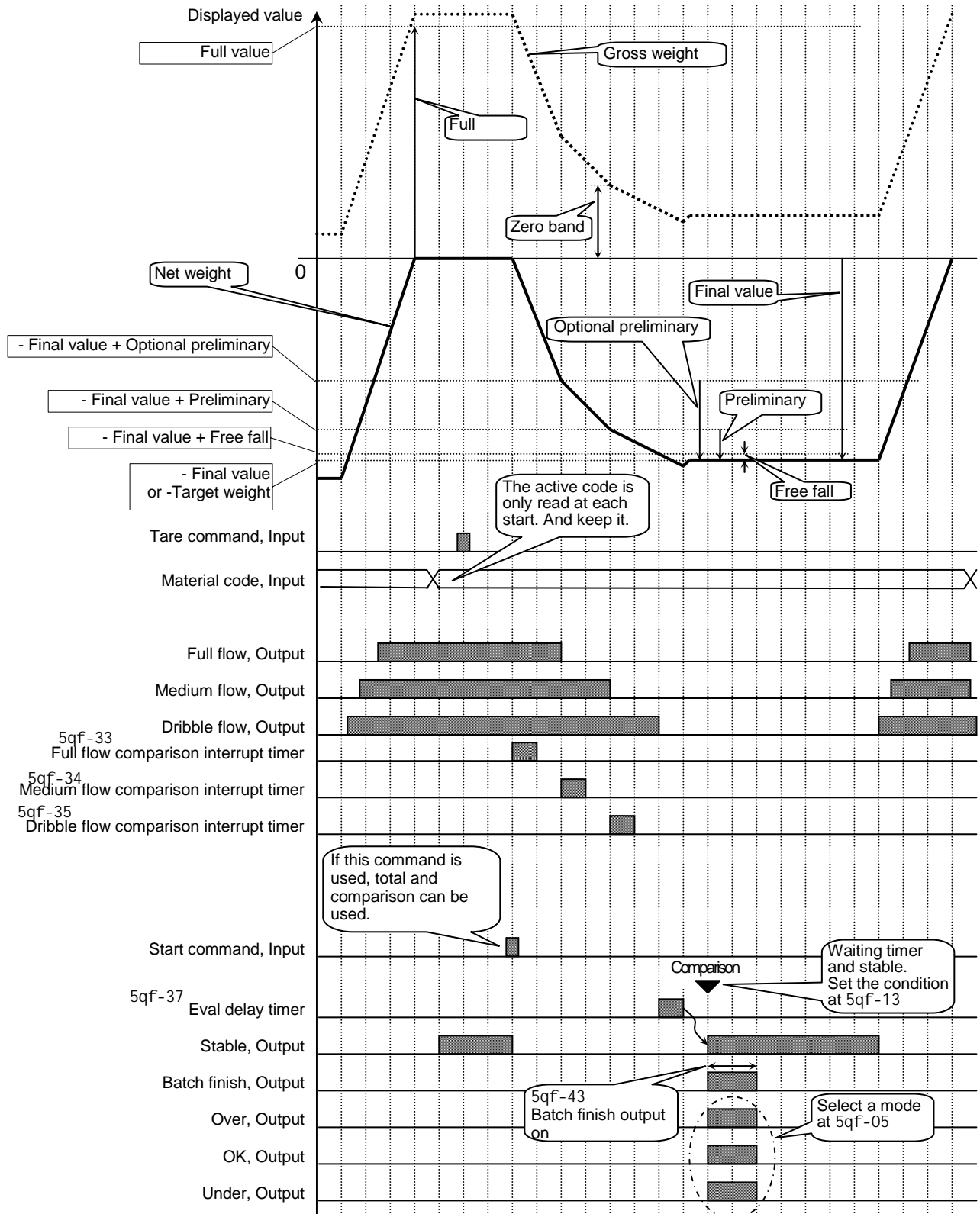
- This function outputs gate control signals that are derived from the compared setpoint and weighing data of the materials from the hopper.
- When the weight decreases past the setpoint, the gate control signal turns off. When the weight increases past the setpoint, the gate control signal turns on.
- The weighing mode in this function is bi-directional. Therefore, the comparison is repeatable (reversible).

### Concerning Parameters of the Function

- Using loss-in-weigh of the comparison function  
[5qf- 1] [1] Customer programmed control  
[5qf- 3] [1] Loss-i n-wei gh  
[Function] - [Function setting] - [Sequence] - [Basic]
- Using the external control switch for normal batch and loss-in-weigh.  
[5qf- 3] [2] External exchange  
If the external switch is used, connect it to the I/O terminals. This mode can use three gates.  
[Function] - [Function setting] - [Sequence] - [Basic]
- Checking whether there are remains from the last weighing operation in the hopper.  
[5qf-55] Add final value and zero band  
When the remains reach a weight that is under the **final value + zero band**, the zero band signal is output.  
[Function] - [Function setting] - [Sequence] - [Setpoint (Compared value)]
- Using the external switch  
[1n f-nn] [9] Supply switch control  
nn: terminal number of the I/O.  
[Function] - [Function setting] - [Control I/O] - [Input]
- Checking whether there are remains from the last weighing operation in the hopper.  
[5qf-56] Add final value and full value  
When the **final value + full value** is less than the remains (gross) in the hopper, the full signal is output.  
[Function] - [Function setting] - [Sequence] - [Setpoint (Compared value)]
- Changing the accuracy of the comparison  
[5qf-48] Averagi ng Eval ti me  
The average time to criticize the weight.  
[Function] - [Function setting] - [Sequence] - [Timer]
- Using manual compensation  
[1n f-nn] [10] Manual free fall compensation  
[05 f-nn] [10] Manual free fall compensation  
nn: terminal number of the I/O.  
The input to control free fall by an external PLC.  
[Function] - [Function setting] - [Control I/O Function] - [Input]

## Advise

- Using the automatic switch of normal batch and loss-in-weigh.
  - Specify the output terminal for the hopper number in the material code on the I/O.
  - Specify the input terminal to change the mode on the I/O. [1n f-nn] [9]
  - Connect the output terminal to the input terminal.
  - Connect the output common terminal to the input common terminal.
  - Set the delay time above 0.1 second at [5qf-32] Batch start delay timer.





## 7.5. Other Functions

### 7.5.1. Re-Zero Operation

---

- Performing this function, a gross display is zeroed and the current displayed value is used as a standard point.
- The operation of the function can be performed from the front panel key, the input terminal of the I/O and command input.
- The adjustable range is based on the zero calibration and Zero range [genf- 6] of the function list. The range is displayed in the unit of percentage of the weighing capacity.
- The re-zero data is stored in memory even without power.
- Resetting the re-zero data, use the I/O terminal or the F1 ~ F4 key that is set to Zero clear [1n f-nn] [2].

nn: terminal number of I/O.

#### Caution

- **When the internal A/D converter is out of range, the re-zero operation be not performed and the error code ZR. ERR is displayed.**

#### Concerning Parameters of the Function

- Changing the range to do the re-zero operation.  
[genf- 6]      Zero range  
                  The maximum range is 30% of the capacity.  
                  [Function] - [Function setting] - [General] - [Weighing]
- Using the prohibition of the re-zero operation in the unstable condition.  
[genf- 9]      Tare and zero compensation at unstable status  
                  [Function] - [Function setting] - [General] - [Weighing]
- Turning on the display, the re-zero function is used.  
[genf-13]      Clear mode at power ON  
                  [Function] - [Function setting] - [General] - [Weighing]

### 7.5.2. Zero Tracking Function

---

- This function automatically traces the weighing deviation at the nearly zero point and keeps the zero display of the gross display.

#### Concerning Parameters of the Function

- Changing the time of zero tracking  
[genf- 7]      Zero tracking time  
                  [Function] - [Function setting] - [General] - [Weighing]
- Changing the range of zero tracking  
[genf- 8]      Zero tracking band width  
                  [Function] - [Function setting] - [General] - [Weighing]

### 7.5.3. Tare

---

- The relation of the display is as follows:  
Net = Gross - Tare

#### Concerning Parameters of the Function

- Prohibiting tare during unstable weighing  
[genf- 9]           Tare and zero compensation at unstable status  
[Function] - [Function setting] - [General] - [Weighing]
- Prohibiting tare during negative weighing  
[genf-10]           Tare at negative GROSS weight  
[Function] - [Function setting] - [General] - [Weighing]
- Resetting tare at turning on the indicator  
[genf-13]           Clear mode at power ON  
[Function] - [Function setting] - [General] - [Weighing]

### 7.5.4. Preset Tare (Fixed Tare Function)

---

- A preset tare can be stored in each material code.

#### Concerning Parameters of the Function

- Using preset tare  
[genf-11]           Preset tare  
[Function] - [Function setting] - [General] - [Weighing]
- Using preset tare for partial material code  
[genf-12]           Preset tare=0  
[Function] - [Function setting] - [General] - [Weighing]
- Classifying normal tare and preset tare on the serial data  
[genf-07]           Tare Header  
[Function] - [Function setting] - [General] - [Weighing]

### 7.5.5. Customizing the Function Key (Key Design)

---

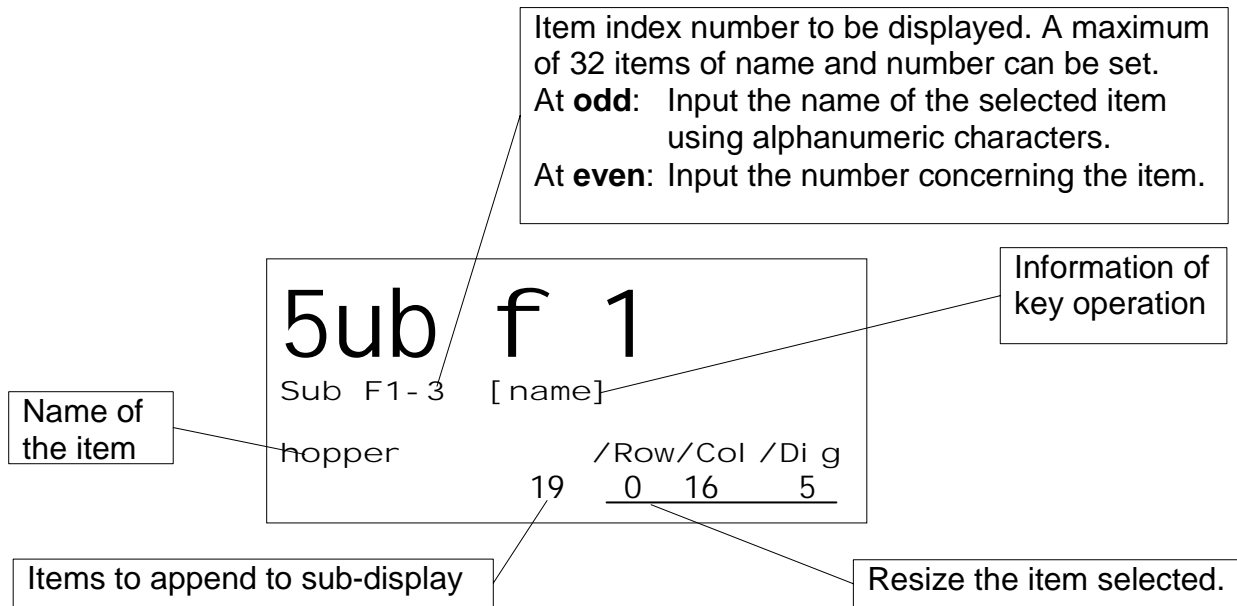
Refer to " 2.2.1. Keys" of the front panel regarding key operation.  
Refer to "10.4. Parameter List" of the function list regarding key function.

#### Concerning Parameters of the Function

- Setting F1, F2, F3 and F4 keys  
[0tHf- 2] to [0tHf- 5]  
[Function] - [Function setting] - [General] - [Other]

## 7.5.6. Customizing the Sub Display

- Use the default sub-display pattern, if you want to reset it.
- Refer to "10.4. Parameter List" of the function list regarding these items.



### Row and Colum Address

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
0																											
1																											
2																											
3																											

Row 0 and 2 are dot matrix display for alphanumerical charactor.

Row 1 and 3 are 7-segment display for numerical charactor.

### Items to append to the sub-display

Number	Name and Number to Display the Item	Row size	Columnsize	Figures
0	Not displayed	0 to 3	0 to26	1 to12
1	Material			
2	Hopper			
3	Final value			
4	Free fall			
5	Preliminary			
6	Optional preliminary			
7	Over			
8	Under			
9	Zero Band			
10	Full			
11	Tare			
12	Supplementary flow open timer			
13	Supplementary flow close timer			

Number	Name and Number to Display the Item	Row size	Columnsize	Figures
14	Automatic Free Fall Compensation			
15	Internal reserved			
16	Internal reserved			
17	Initial dribble flow			
18	Initial dribble flow			
19	Total weight			
20	Total count			
21	Recipe , rCode			
22	Total weight for recipe mode			
23	Total counts for recipe mode			

### Concerning Parameters of the Function

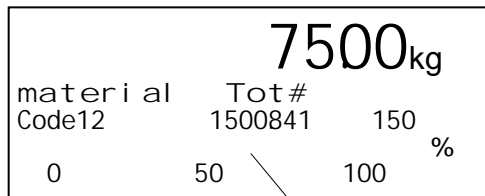
- Setting the sub-display  
 [5ubf- 1] [1] Wei ghi ng di spl ay  
 [Function] - [Function setting] - [General] - [Sub-display]

### 7.5.7. Graphic Display

---

- Use to display a bar-graph in the sub-display.

Example:



Bar graph

### Concerning Parameters of the Function

- Using the bar graph display  
 [5ubf- 3] Bar graph l ocati on  
 [Function] - [Function setting] - [General] - [Sub-display]
- Selecting the ratio of the graph display  
 [5ubf- 4] Rati o of graph di spl ay  
 [Function] - [Function setting] - [General] - [Sub-display]

## 7.5.8. Total Operation

---

- Total weight data and weighing count of each material code or recipe code.

### Concerning Parameters of the Function

- Using F1 ~ F4 key for total  
[0tHf- 2] to [0tHf- 5]  
[Function] - [Function setting] - [General] - [Other]
- Using the I/O terminals for total  
[1n f-nn] nn: terminal number of the I/O.  
[Function] - [Function setting] - [Control I/O] - [Input]
- Using the parallel terminals for total  
[05 f-nn] nn: terminal number of the option.  
n: slot number installed the option.  
[Function] - [Function setting] - [slot n] - [OP-05]

## 7.5.9. Undoing the Total Operation

---

- Assign an operation input to undo the last result.  
Refer to "10.4. Parameter List" of the function list regarding key function.

## 7.5.10. Clearing (Deleting) the Totaled Data

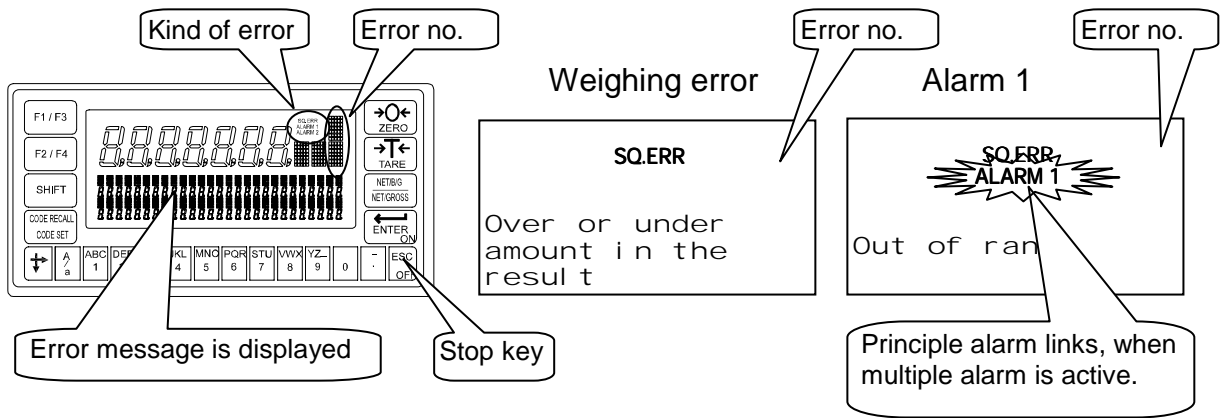
---

- Total data can be deleted (cleared) using the preset operation input.
- There are four types of clearing the data.
- Assign an operation input to undo the last result on the function list.  
Refer to "10.4. Parameter List" of the function list regarding key function.



## 7.5.11. Error Message and Alarm

- When the indicator detects an error in the weighing system, an error message is displayed.
- When the indicator becomes a preset condition, it is announced with the preset alarm.



### Kind of Alarm and Error

There is the following priority.

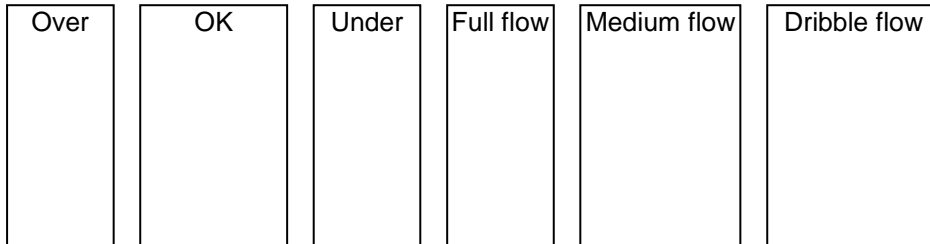
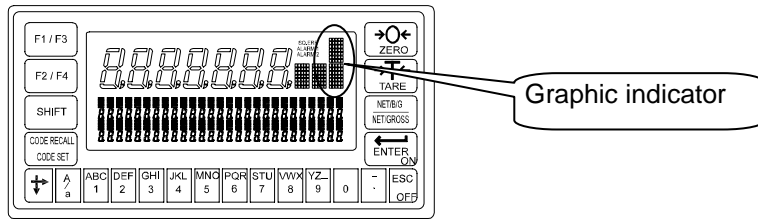
Weighing sequence error < Zero error < Alarm 1 < Alarm 2  
 SQ. ERR                      ZR. ERR                      ALARM 1                      ALARM 2

Kind	No.	Description
Weighing sequence error SQ. ERR		When the weighing can not continue, a message is displayed and the sequence is stopped. Cope with cause and restart the weighing.
	0	The weighing sequence stopped. Cope with cause and restart the sequence.
	1	Safety check can not be completed. Check the safety.
	2	Under weight or over weight. Compensate weight and restart.
	3	There is a conflict in setpoint Check setpoint
	4	Time over of batch weighing. Check the gate and remains of hopper.
	5	Time over of discharge. Check the discharge gate.
	6	The remains are not enough to weigh. Add material.
	7	When the batch is started, the weight is full already.
	8	Nozzle is touching the hopper. Check the nozzle.
9	There is no tare (vessel) on the weighing pan.	

Kind	No.	Description
Zero error ZR. ERR	When the displayed value can not be set to zero with re-zero or tare, the message is displayed.	
	0	Dispaly can not be zeroed by zero compensation.
	1	Dispaly can not be zeroed by tare operation.
Alarm 1 ALARM 1	When the weighing value is out of range and emergency stop is performed, this symbol is displayed.	
	1	Weighing value is out of range.
	9	Emergency stop has been performed.
Alarm 2 ALARM 2	It can not weigh. Check the weighing system. Example: loadcell cable, connctors.	
	1	A/D converter is positive over count. Check the loadcell cable.
	2	A/D converter is negative over count. Check the loadcell cable.
	4	RAM error. Check the backup battery

## 7.5.12. Graphic Status Indicator

- The indicator can display weighing status, result on the graphic indicator.



### Concerning Parameters of the Function

- Using the graphic indicator  
[5ubf- 5]      Activity indicator  
[Function] - [Function setting] - [General] - [Sub display]

## 7.5.13. Memory Backup

- The indicator has two kinds of memory.
  - Flash memory      The memory is used to store important data without power supplied that the occurrence of re-writing them is seldom.  
Life of re-writing them is approximately 100,000 times or more.  
Data example: Calibration data, Function data
  - Backup RAM      The memory is used to store temporary data that the occurrence of re-writing them is often.  
Life of the battery is approximately 10 years at 25 °C, normal use  
Data example: Tare value, total data, re-zero data
- When re-writing data, the sequence is stopped.
- Material code and recipe code can be stored in flash memory or backup RAM.

### Concerning Parameters of the Function

- Selecting the memory for material code or recipe code  
[0tHf-11]      Save data  
[Function] - [Function setting] - [General] - [Other]



# 8. Interface



## 8.1. Control I/O Function

Input terminals  
Output terminals

11 lines that can select by the function  
11 lines that can be selected by the function  
Open collector transistor

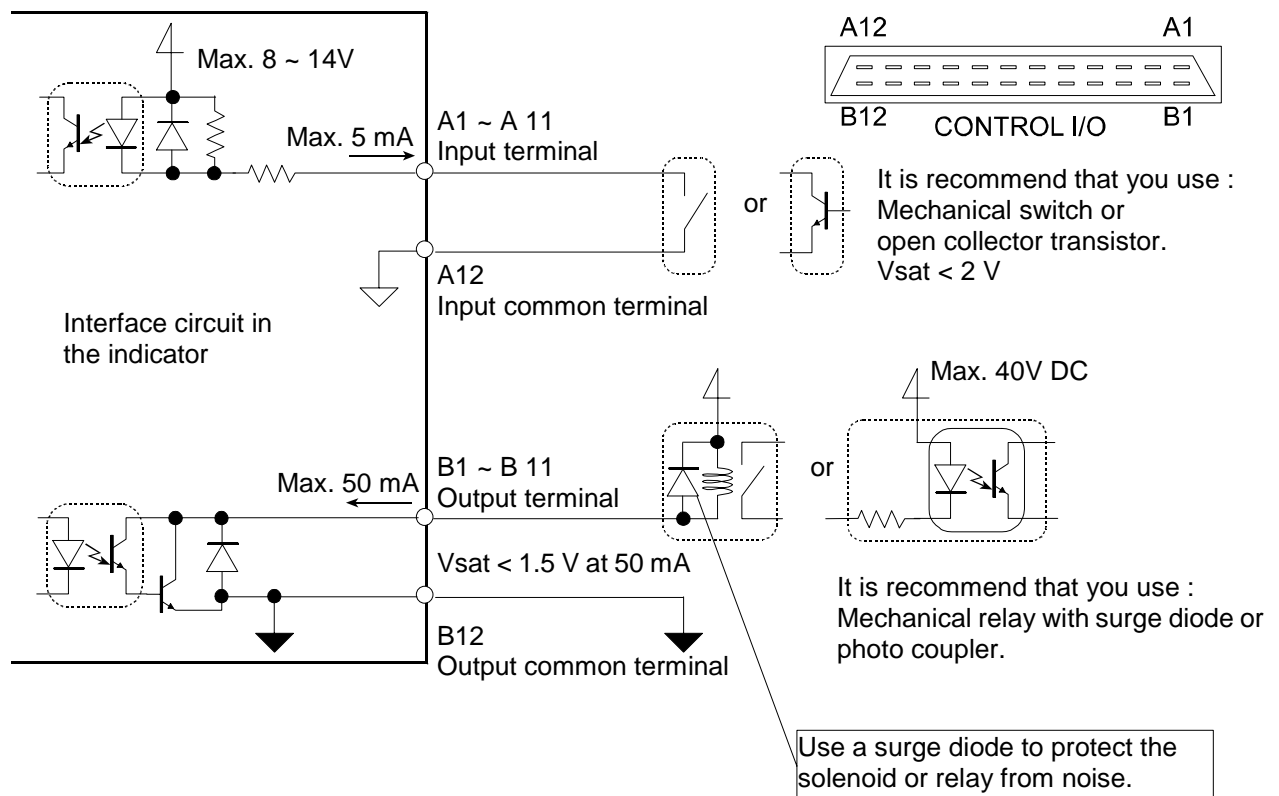
Input terminal

	Maximum	typ.
Input open voltage	14V DC	8 V DC
Input drive current	5 mA	3 mA
Saturation tolerance voltage	2 V DC	

Output terminal

	Maximum
Output voltage	40 V DC
Output current	50 mA
Saturation tolerance voltage	1.5 V at 50 mA

### 8.1.1. Interface Circuit



The function assigned to terminals

The function of the terminal can be assigned arbitrarily. Refer to "10.4. Parameter List" of the function list

## 8.1.2. Timing Chart

---

### **Caution**

**Keep the delay time to avoid abnormal-operation and noise.**

**Keep the input signal more than 40 ms to avoid noise and chattering.**



## 8.2. Built-in RS-485 Interface

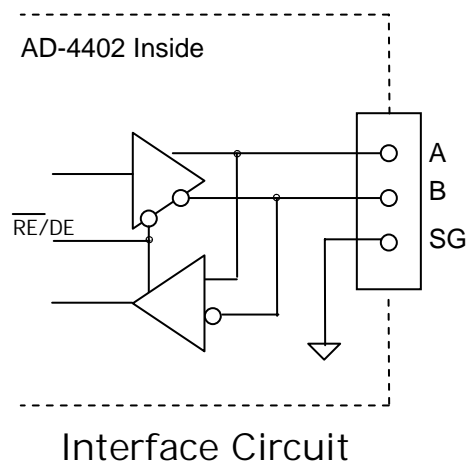
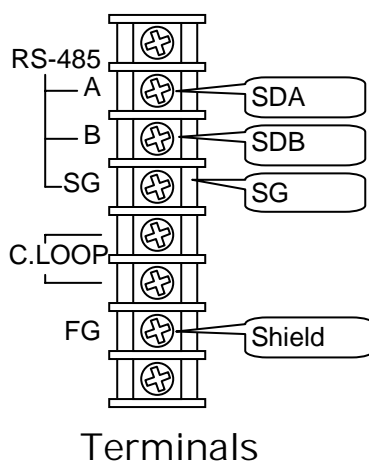
- The RS-485 interface can use commands to control the indicator. The interface can read weighing data or parameters and store parameters in the indicator.
- The interface can connect a maximum of 32 units and a personal computer using a communication cable.
- Each unit is specified by an address appended to the command.

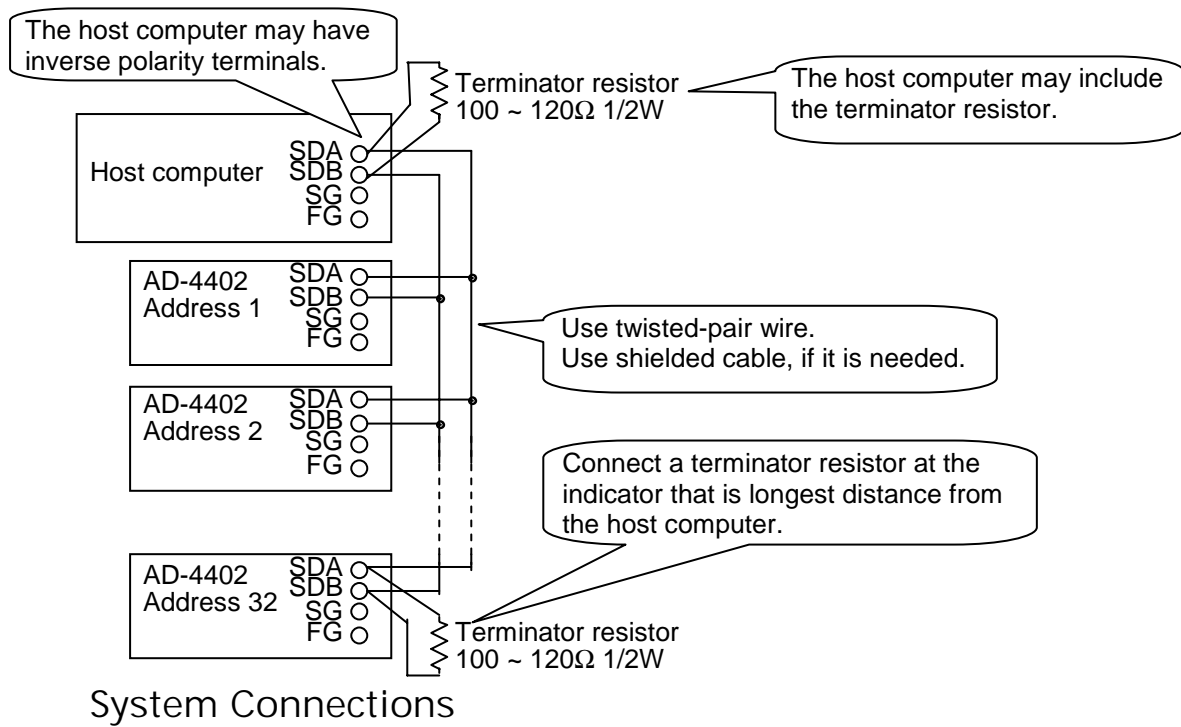
Transmission system	EIA RS-485, Asynchronous, bi-directional, half-duplex
Data length	7 bits or 8 bits
Start bit	1 bit
Parity bit	Odd, Even, not used
Stop bits	1 bit, 2 bits
Baud rate	600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps
Line	2 wires (2-balanced wires)
Connection	Max. 32 units
Character code	ASCII code
Terminator	CR, CR LF

### The way of Use and Notes

- When using terminator, connect it between the SDA and SDB terminals using the accessory resistor.
- If there is no signal ground at the host computer, it is not necessary to use the SG terminal.
- If the shield cable is used, connect the FG terminal to the shield line.
- When connecting to RS-232C, Use AD-7491 or a converter of RS-232C/ RS-485 on a market.
- Use a multi-drop connection for command mode.  
Do not use a multi-drop connection in stream mode or jet stream mode.

### 8.2.1. Connection





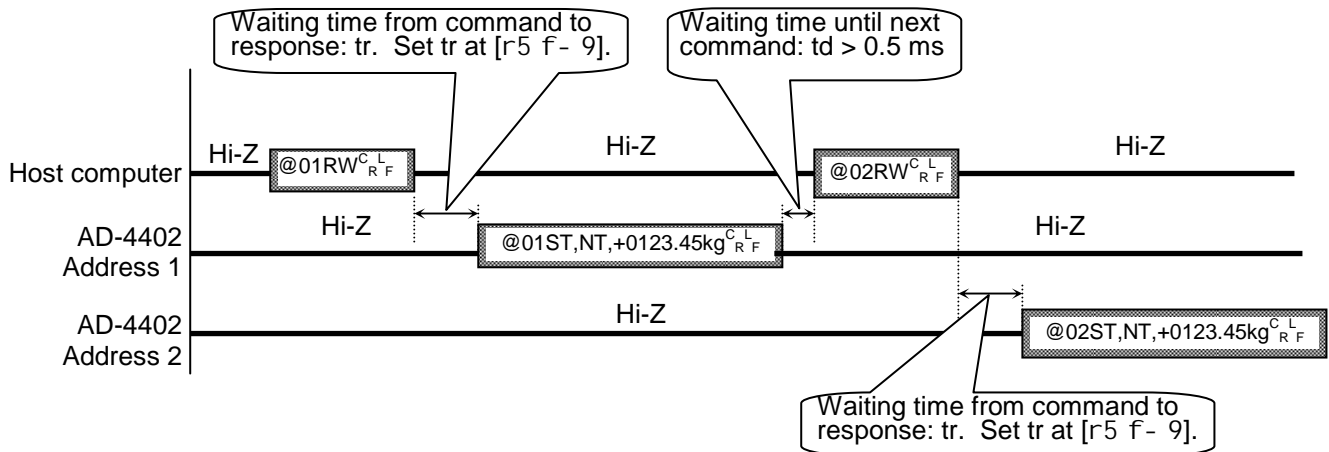
## 8.2.2. Settings of Parameters

---

Refer to the "10.4. Parameter List" of the function list.

## 8.2.3. Timing Chart

- Keep the delay time above 0.5 ms between the last response and the next command.
- Set response time ( $t_r$ ).  $[r5 f- 9] < t_r < [r5 f- 9] + 50 \text{ ms}$
- Use a long delay time, when there is noise.
- Hi-Z: Hi impedance



## Communication Modes

- There are the following modes.

### Stream Mode

The data is output at each display update. If the data can be not output completely due to a slow baud rate, the data is output at the next update.

### Auto Print Mode

The data is printed at batch finish and recipe finish automatically.

### Total Print Mode

When accumulating data or canceling the last result, the results of batch finish and recipe finish are printed.

### Manual Print Mode

When the preset print key is pressed or terminal is connected, the data is output.

### Command Mode

This mode is used to control the indicator, to store parameters and to read data or parameters.

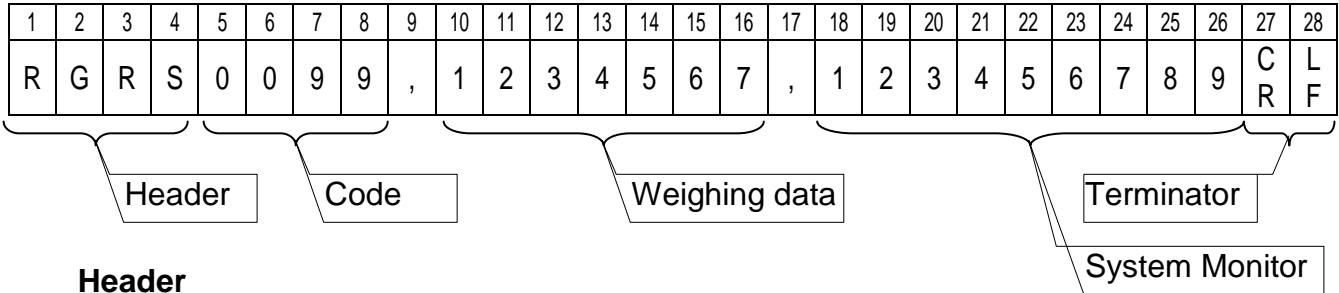
### Jet Steam Mode

The weighing data and state is output 100 time/s. The data is the gross or net value. The format is the same as command RGRS or RNET. Set the baud rate to 38400 bps.



## 8.2.4. General Data Format

This format is used for the command mode and jet stream mode.



### Header

Command is echoed. The echoed command is 4 characters

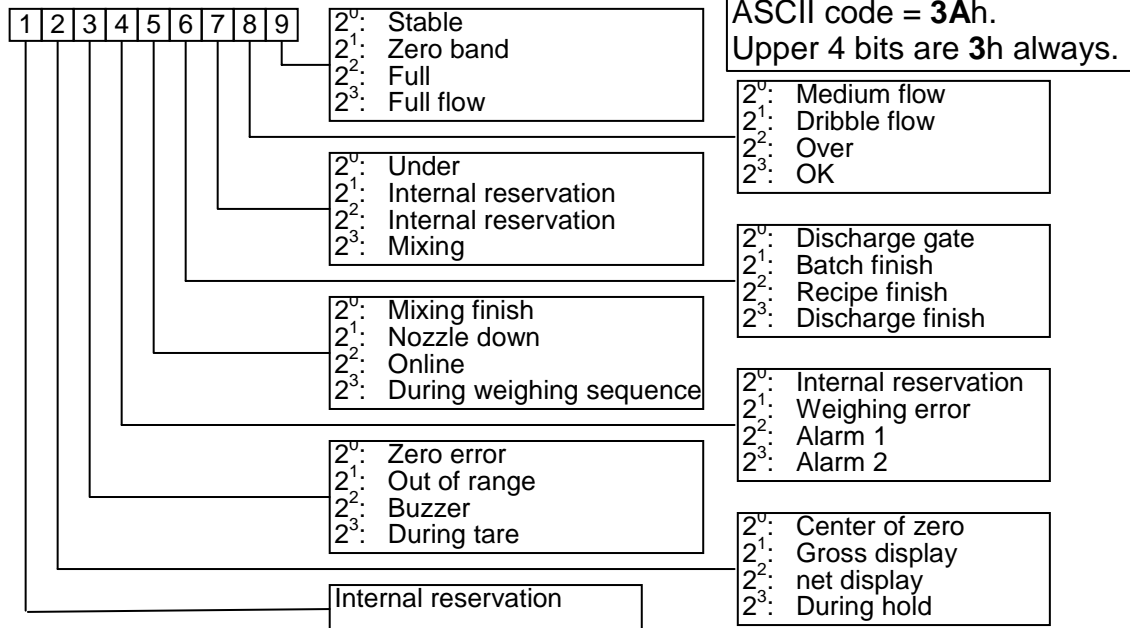
### Code

Material code or recipe code number. The code is 4 characters

### Weighing data

Data uses BCD code, is 7 figures and does not include a decimal point.  
When data is negative, a minus sign is appended to the head.

### System Monitor



### Terminator

CR or CR + LF

CR: **0Dh**, LF: **0Ah**

## 8.2.5. A&D Data Format

This format is used for stream mode, auto print mode and total print.  
This format is compatible to the AD-4325 indicator.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
S	T	,	N	T	,	+	0	0	1	2	.	3	4	k	g	CR	LF

### Header 1

ST Stable  
US Unstable  
LO Out of range

### Header 2

GS Gross value  
NT Net value  
TR Tare value

### Weighing data

Data uses BCD code, is 7 figures and includes a decimal point.  
When data is negative, a minus sign is appended to the head.  
When data is out of range, all numerical characters are space (20h).

### Unit

kg, g or t

### Terminator

CR or CR + LF

CR: 0Dh, LF: 0Ah

## 8.2.6. Address

Set the address in [r5 f- 8].

32 indicators can be connected to a computer.

There is no relation between communication mode [r5 f- 2] and address [r5 f- 8].

### Broadcast Address

When address @00 is used, send a command to all indicators at the same time.

Example:



## 8.2.7. Command List

### Monitor Commands

Name	Code	Description
Read displayed value	RDSP	
	RW	
Read gross data	RGRS	
Read net value	RNET	
Read tare value	RTAR	
Read weighing result	RFIN	
	RF	#1
Read setpoint or Read comparison parameters	RSPTxxxx	
	RSPT####	
	RSxx	#1
Read material code	RCODxxxx	To read the details of the code. # 1
Read recipe code	RRCdxxxx	To read the details of the code. # 1
Read total data of material code	RTTLxxxx	
Read total data of recipe code	RRTLxxxx	
Read error code	RERR	

xxxx: Material code or recipe code.

#1: Compatible command to AD4401, AD-4403 and AD4325.

### Write Commands

Name	Code	Description
Store setpoints Store comparison parameters	WSPTxxxx	
	WSPT%%%%	
	SSxx	#1
	SA	To store optional preliminary and zero band. #1
Store material code	WCODxxxx	To store all parameters of the code.
Store recipe code	WRCDxxxx	To store all parameters of the code.

xxxx: Material code or recipe code.

####: When reading an active material code or recipe code during the sequence, place four space codes (ASCII 20h).

%%%%: When storing new parameters to material code or recipe code that is recalled as next code in the sequence, place four space codes (ASCII 20h).

#1: Compatible command to AD4401, AD-4403 and AD4325.

## Control Commands

Name	Code	Description
Make zero display	CZER	
	MZ	#1
Make zero clear	CCZR	
Tare	CTAR	
	MT	#1
Tare clear	CCTR	
	CT	#1
Change to gross display	CGRS	
	MG	#1
Change to net display	CENT	
	MN	#1
Call material code	CCODxxxx	
	CCxx	#1
Call recipe code	CRCDxxxx	
Total command	CACC	
	AM	#1
Cancel the last result	CCAC	
	CA	#1
Batch start	CBAT	
	BB	#1
Discharge start	CDSC	
	BD	#1
Recipe start	CBLD	
Mixing start	CMIX	
Re-start	CRES	
Stop	CHLT	
Emergency stop	CSTP	
	HB	#1
Clear total data of material code	CDTLxxxx	Total data is set to 0.
	DTxx	Total data is set to 0. #1
Clear total data of all material code	CETL	All total data is set to 0.
	ET	All total data is set to 0. #1
Clear total data of recipe code	CDRTxxxx	Total data is set to 0.
Clear total data of all recipe code	CERT	All total data is set to 0.
Reset an error	CRER	
No operation	CNOP	

xxxx: Material code or recipe code.

#1: Compatible command to AD4401, AD-4403 and AD4325.

## Response Error Code

Response	Description	Note
?E	The format of command is not correct.	When an address is used, address is appended to the response.
VE	The data of command is not correct.	
IE	Indicator is busy.	

## ASCII Code for AD-4402

The characters are special code for the name of material code and recipe code. Therefore, some characters are not the same as U.S. code.

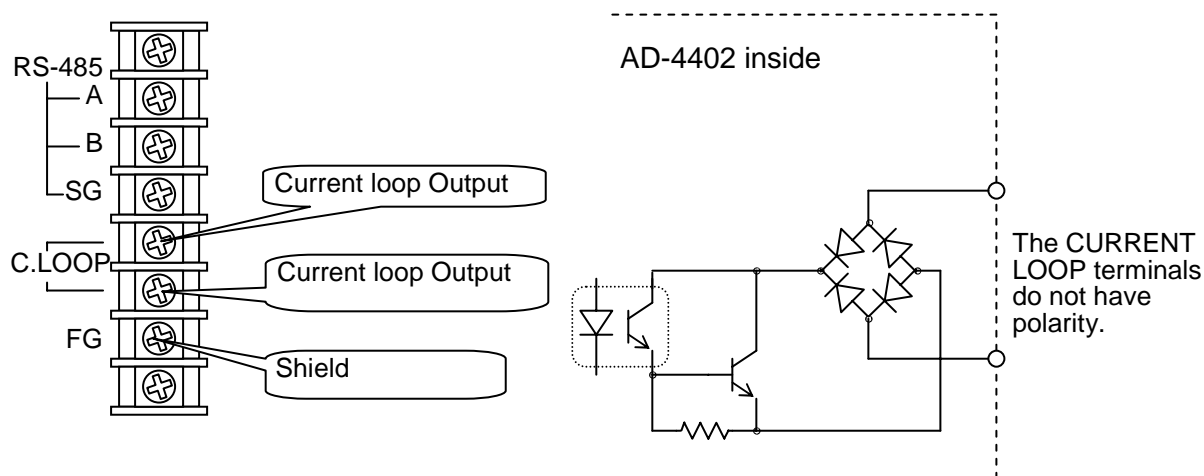
		Lower bits							
		0	1	2	3	4	5	6	7
Upper bits	0			Space	0	@	P	Space	p
	1			!	1	A	Q	a	q
	2			"	2	B	R	b	r
	3			#	3	C	S	c	s
	4			\$	4	D	T	d	t
	5			%	5	E	U	e	u
	6			&	6	F	V	f	v
	7			'	7	G	W	g	w
	8			(	8	H	X	h	x
	9			)	9	I	Y	i	y
	A	LF		*	:	J	Z	j	z
	B			+	;	K	[	k	{
	C			,	<	L	¥	l	
	D	CR		-	=	M	]	m	}
	E			.	>	N	^	n	●
	F			/	?	O	_	o	○



## 8.3. Built-in Current Loop Output

Transmission system	EIA RS-232C, Asynchronous, bi-directional, half-duplex
Current	1 = 20mA, 0 = 0 mA, external DC current source
Data length	7 bits
Start bit	1 bit
Parity bit	Even
Stop bits	1 bit
Baud rate	600 bps, 1200 bps, 2400 bps
Code	ASCII code

### 8.3.1. Connection



The current loop output has no polarity.  
 Use an external DC current source.  
 Connect the FG terminal when using a shielded cable.

### 8.3.2. Communication Modes

- There are the following modes.

#### Stream Mode

The data is output at every display update. If the data can not be output completely due to a slow baud rate, the data is output at the next update.

#### Auto Print Mode

The data is printed at batch finish and recipe finish automatically.

#### Manual Print Mode

When the preset print key is pressed or terminal is connected, data is output.

#### Total Print Mode

When accumulating it or canceling the last result, the results of batch finish and recipe finish are printed. When canceling the last results, the inverse polarity data is output.

### 8.3.3. Data Format

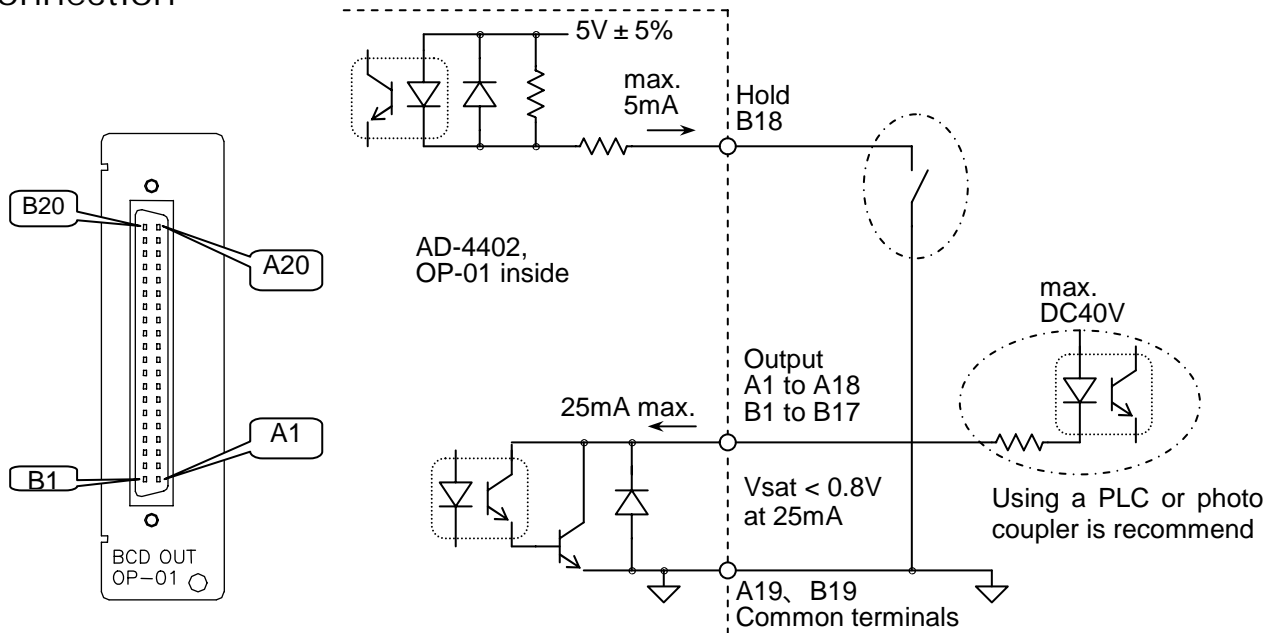
The format is the same as A&D format of the built-in RS-485.



## 8.4. BCD Output of Option OP-01

Output circuit	Open collector transistor
Output voltage	40 V DC max.
Output saturation voltage	0.8 V at 25 mA
Input control	Contact to common
Input open voltage	5 V DC $\pm 5\%$
Input current	5 mA max.
Threshold voltage	1.5 V max.

#### Connection



## Terminals

When weighing display, gross display, net display or tare display [01f- 1] [1, 2, 3, 4] is used, the function of the terminals are as follows:

A1	1	B1	2	Unit	Unit 1	Unit 2
A2	4	B2	8	blank	0	0
A3	10	B3	20	kg	0	0
A4	40	B4	80	t	0	1
A5	100	B5	200	g	1	1
A6	400	B6	800			
A7	1,000	B7	2,000			
A8	4,000	B8	8,000			
A9	10,000	B9	80,000			
A10	40,000	B10	80,000			
A11	100,000	B11	200,000			
A12	400,000	B12	800,000			
A13	Over	B13	Positive polarity			
A14	Stable	B14	Net			
A15	Decimal point 0.0	B15	Decimal point 0.0			
A16	Decimal point 000.0	B16	Decimal point 000.0			
A17	Unit 1	B17	Unit 2			
A18	Strobe	B18	Hold input			
A19	Common ground	B19	Common ground			
A20	Frame ground	B20	Frame ground			

When total weight and total count [01f- 1] [5, 6, 7, 8] are used, the function of the terminals are as follows:

A1	1	B1	2
A2	4	B2	8
A3	10	B3	20
A4	40	B4	80
A5	100	B5	200
A6	400	B6	800
A7	1,000	B7	2,000
A8	4,000	B8	8,000
A9	10,000	B9	80,000
A10	40,000	B10	80,000
A11	100,000	B11	200,000
A12	400,000	B12	800,000
A13	1,000,000	B13	2,000,000
A14	4,000,000	B14	8,000,000
A15	10,000,000	B15	20,000,000
A16	40,000,000	B16	80,000,000
A17	Over	B17	Positive polarity
A18	Strobe	B18	Hold input
A19	Common ground	B19	Common ground
A20	Frame ground	B20	Frame ground



When recipe code and material code [01f- 1] [9] are used, the function of the terminals are as follows:

A1	Material code at weighing sequence	1	B1	Material code at weighing sequence	2
A2		4	B2		8
A3		10	B3		20
A4		40	B4		80
A5	Referred material code	1	B5	Referred material code	2
A6		4	B6		8
A7		10	B7		20
A8		40	B8		80
A9	Recipe code at weighing sequence	1	B9	Recipe code at weighing sequence	2
A10		4	B10		8
A11		10	B11		20
A12		40	B12		80
A13	Referred recipe code	1	B13	Referred recipe code	2
A14		4	B14		8
A15		10	B15		20
A16		40	B16		80
A17			B17		
A18	Strobe		B18	Hold input	
A19	Common ground		B19	Common ground	
A20	Frame ground		B20	Frame ground	

When Error and alarm [01f- 1] [10] are used, the function of the terminals are as follows:

A1	Sequence error number	1	B1	Sequence error number	2
A2		4	B2		8
A3		Error	B3		
A4			B4		
A5	Zero error number	1	B5	Zero error number	2
A6		4	B6		8
A7		Error	B7		
A8			B8		
A9	Alarm 1 number	1	B9	Alarm 1 number	2
A10		4	B10		8
A11		Error	B11		
A12			B12		
A13	Alarm 2 number	1	B13	Alarm 2 number	2
A14		4	B14		8
A15		Error	B15		
A16			B16		
A17			B17		
A18	Strobe		B18	Hold input	
A19	Common ground		B19	Common ground	
A20	Frame ground		B20	Frame ground	

## Communication Modes

- There are the following modes.

### Stream Mode

The data is output at every display update. If the data can not be output completely due to slow baud rate, the data is output at the next update.

### Auto Print Mode

The data is printed at batch finish and recipe finish automatically.

### Manual Print Mode

When the preset print key is pressed or terminal is connected, data is output.

### Total Print Mode

When accumulating it or canceling the last result, the results of batch finish and recipe finish are printed. When canceling the last results, the inverse polarity data is output.

### Jet Steam Mode

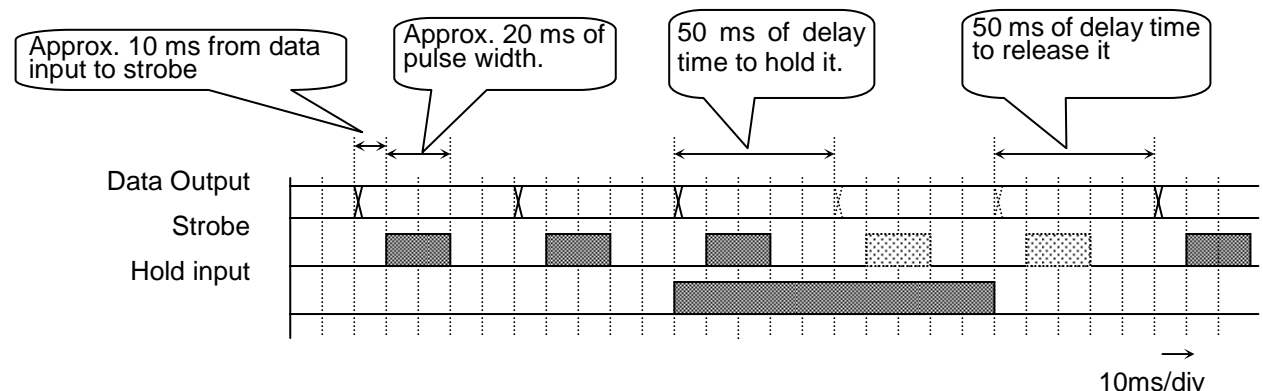
The weighing data and state are output 100 time/s. The data is the gross or net value. The format is the same as command RGRS or RNET.

Set baud rate to 38400 bps.

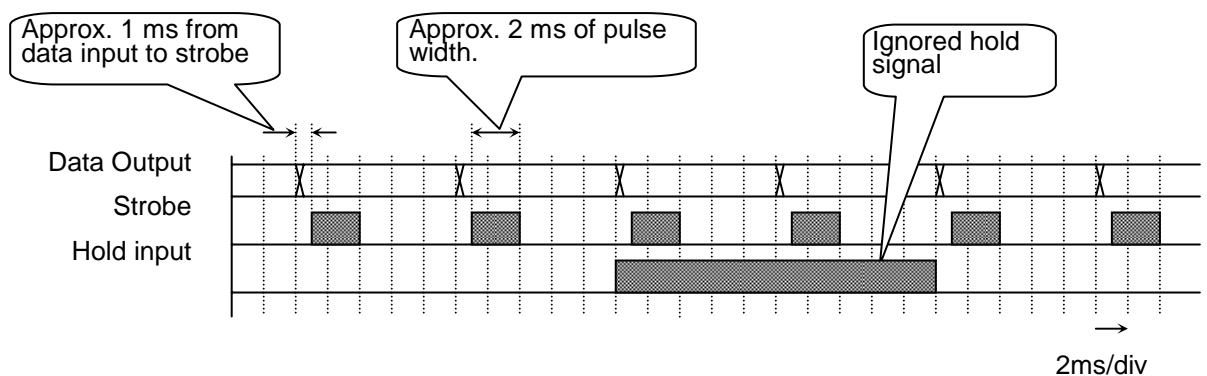
When slow baud rate is  $1/2^n$  times 38400 bps, the same data is output  $2^n$  times

## Timing Chart

When **normal output** [01f- 3]  $\neq 5$  is used



When **jet steam mode** output [01f- 3] = 5 is used

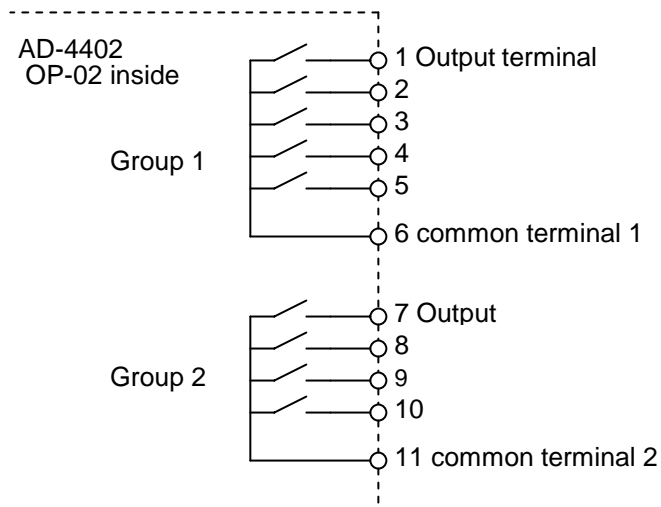
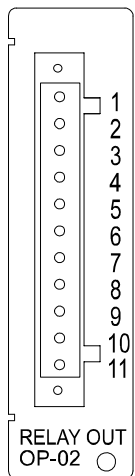




## 8.5. Relay Output of Option OP-02

Rated load	250 V AC, 3 A 30 V DC, 3 A
Current at common terminal	Max. 10A DC
Minimum load	100 mV 100 $\mu$ A
Life	20,000,000 times or more at no load 100,000 times or more at rated load

### Connection



### Terminal List

Refer to "10.4. Parameter List" of the function list.



## 8.6. RS-422/485 Interface of Option OP-03

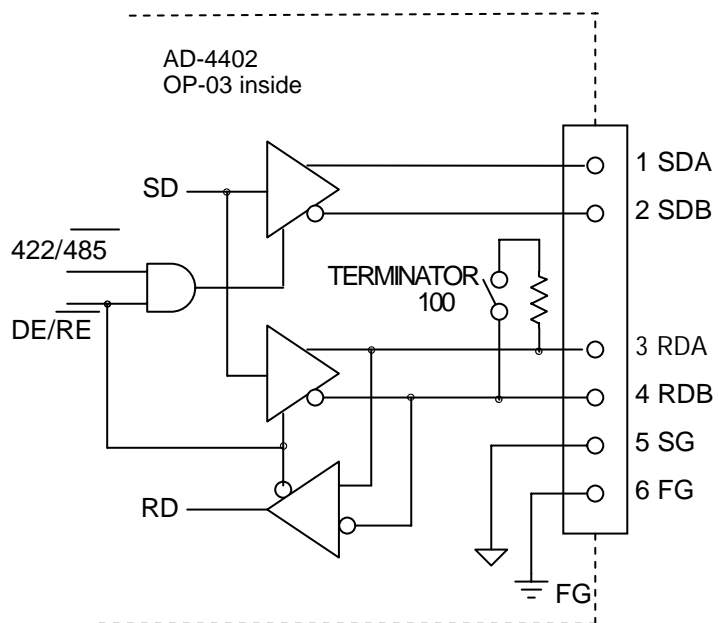
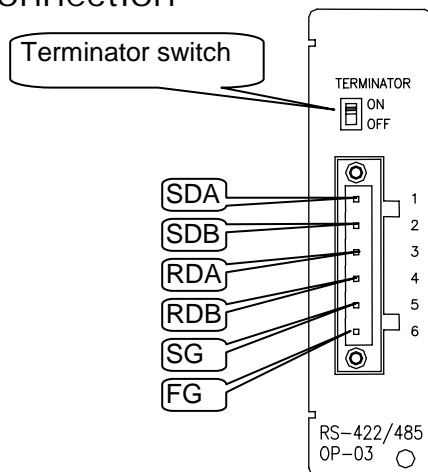
- The RS-422/485 interface can use commands to control the indicator. The interface can read weighing data or parameters or store parameters to the indicator.
- The interface can connect a maximum of 32 units and a personal computer using a communication cable.
- The unit is specified by an address appended to the command.
- RS-485 can use 2-wire or 4-wire.
- The command and format are the same as the built-in RS-485.

Transmission system	EIA RS-422 / 485, Asynchronous, bi-directional, half-duplex
Data length	7 bits or 8 bits
Start bit	1 bit
Parity bit	Odd, Even, not used
Stop bits	1 bit, 2 bits
Baud rate	600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps(Jet stream mode)
Line	RS-422: 4 wires RS-485: 2 wires or 4 wires
Connection	Max. 32 units
Character code	ASCII code
Terminator	CR, CR LF

### Caution

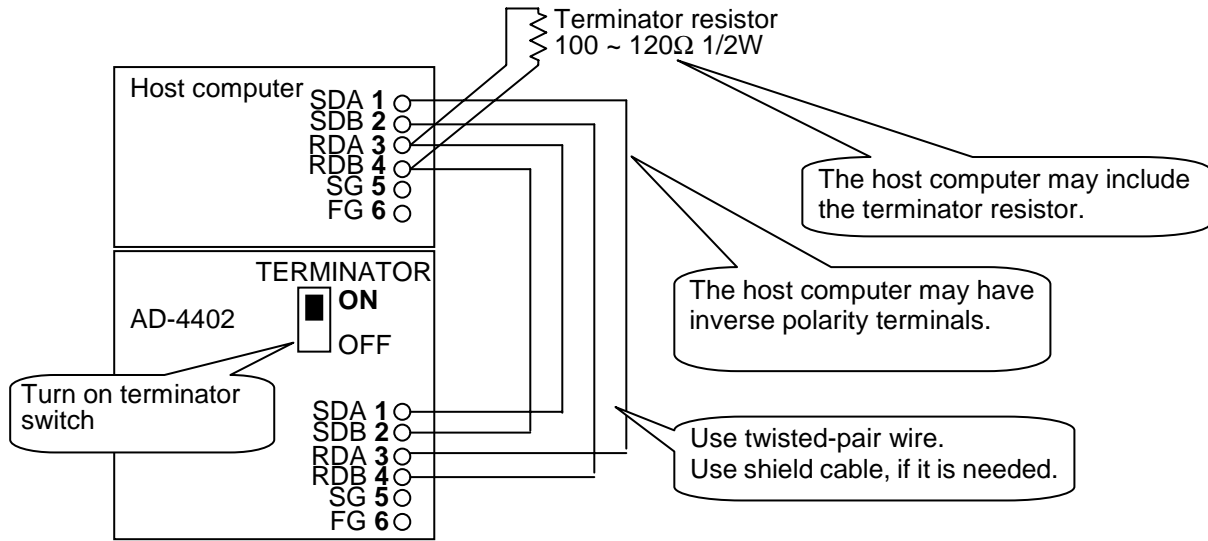
Either option OP-03 or OP-04 can install

### Connection



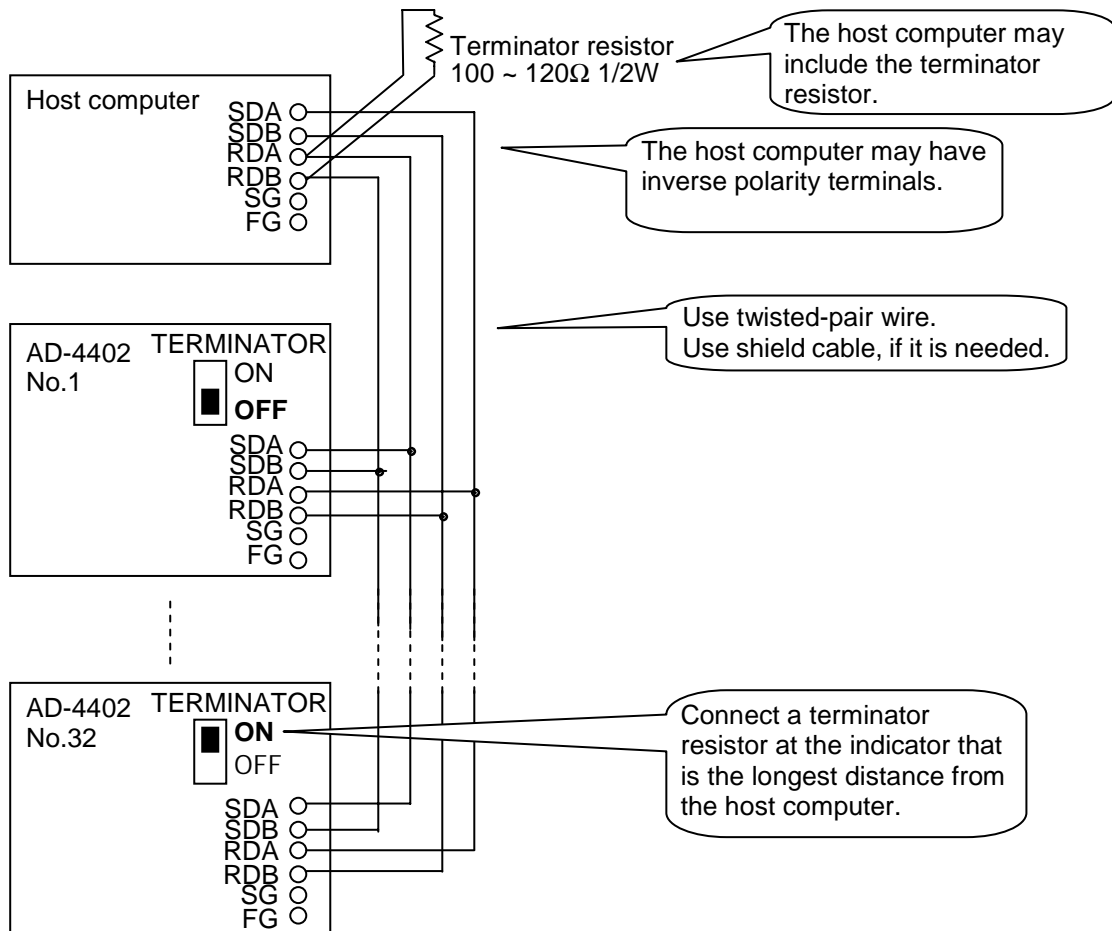
## RS-422 Connections

Settings RS-422 [03 f-11] [1]  
 Address Number 0 [03 f- 8] [0].



## RS-485 4 Wire Connections

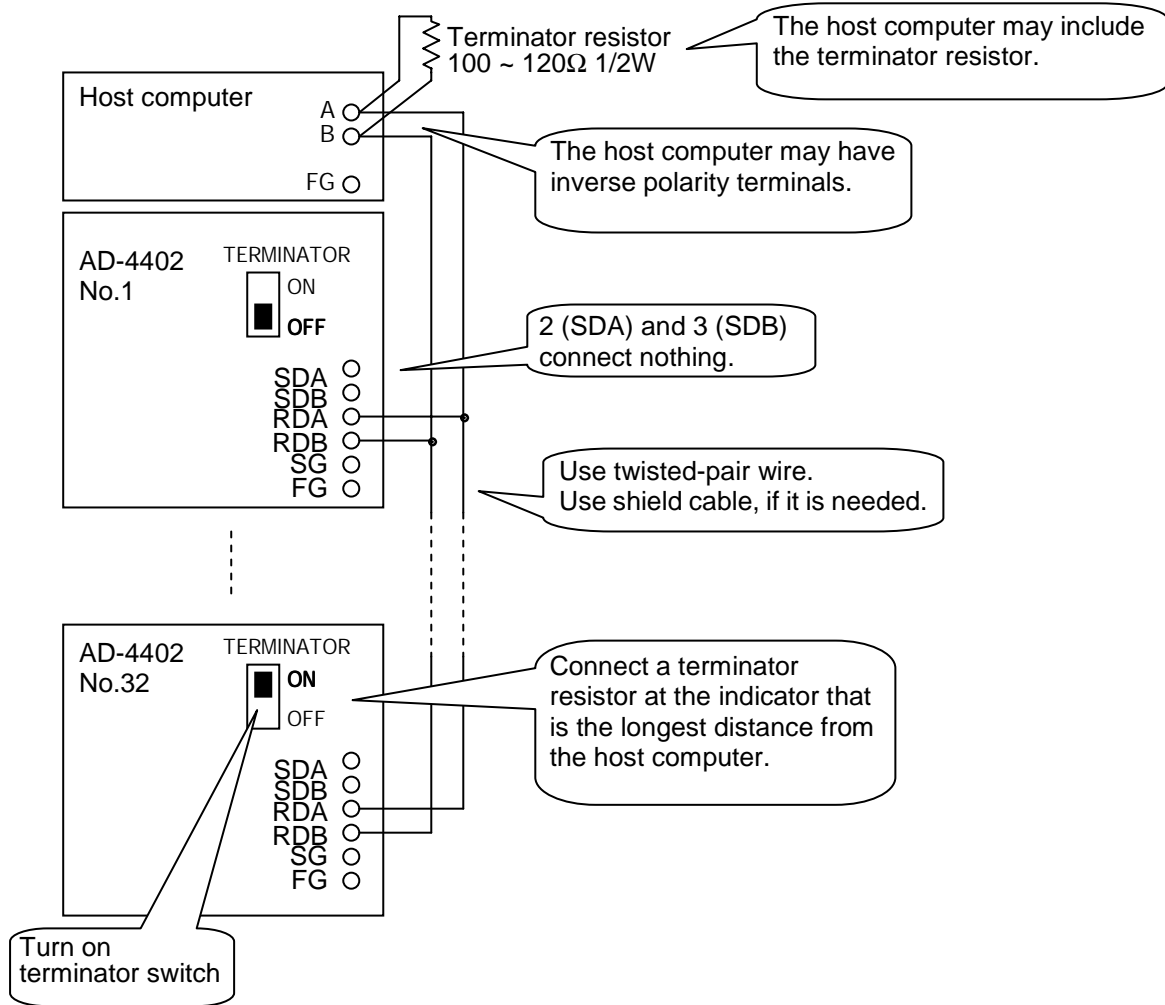
Settings RS-422 [03 f-11] [1]  
 Address Number [03 f- 8] [without 0].



# RS-485 2 Wire Connections

Settings RS-485

[03 f-11] [2]

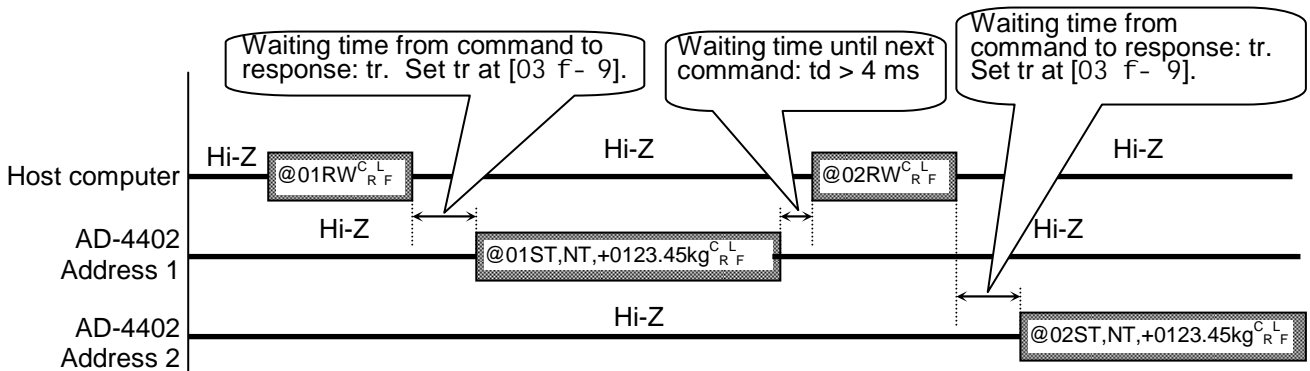


## Settings of Parameters

Refer to "10.4. Parameter List" of the function list.

## Timing Chart

- Keep the delay time above 0.5 ms between the last response and the next command.
- Set response time (tr).  $[03\ f-9] < tr < [03\ f-9] + 50\ ms$
- Use a long delay time, when there is noise.
- Use 4 ms or more from the output finish to receiving the next command
- Hi-Z: Hi impedance





## 8.7. RS-232C Interface of Option OP-04

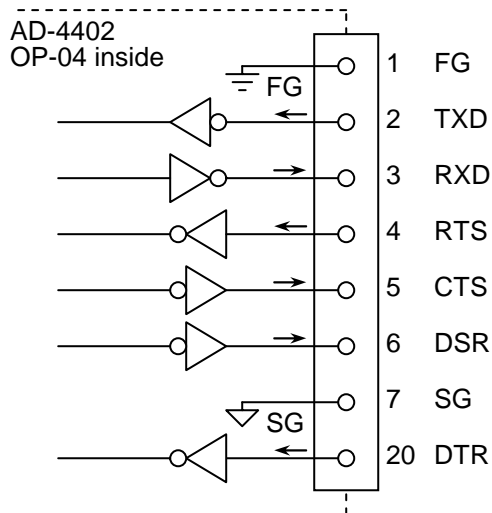
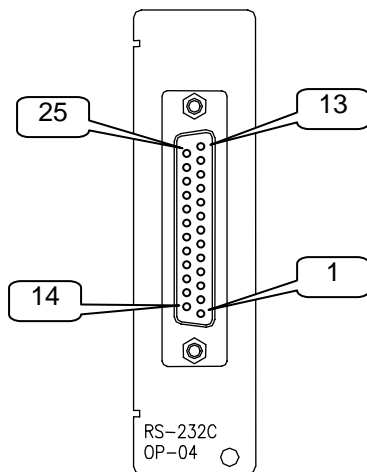
- The RS-232C are used to connect to the DEC (modem).
- The command and parameters of RS-232C is the same as the built-in RS-485.

Transmission system	EIA RS-232C, Asynchronous, bi-directional, half-duplex
Data length	7 bits or 8 bits
Start bit	1 bit
Parity bit	Odd, Even, not used
Stop bits	1 bit, 2 bits
Baud rate	600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps

### Caution

Either option OP-03 or OP-04 can be installed.

### Connection



### Settings of Parameters

Refer to "10.4. Parameter List" of the function list.

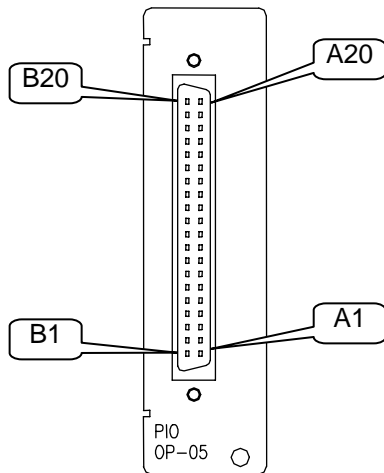


## 8.8. Parallel I/O of Option OP-05

- Use this option to extend the I/O terminals
- The function, settings, interface circuit and timing chart of the option is the same as the built-in I/O terminal.

Input control	Contact to common
Input open voltage	7 ~ 11 V DC
Input current	5 mA max.
Input threshold voltage	2 V max.
Output circuit	Open collector transistor
Output voltage	40 V DC max.
Output saturation voltage	1.5 V at 50 mA

### Connection



A1 ~ A16	Input terminals
A17	Input common
A18	
A19	Frame ground
A20	
B1 ~ B16	Output terminals
B17	Output common
B18	
B19	Frame ground
B20	

### Terminal List

Refer to "10.4. Parameter List" of the function list.

### Caution

**Do not assign the same function to multiple input terminals and keys.**



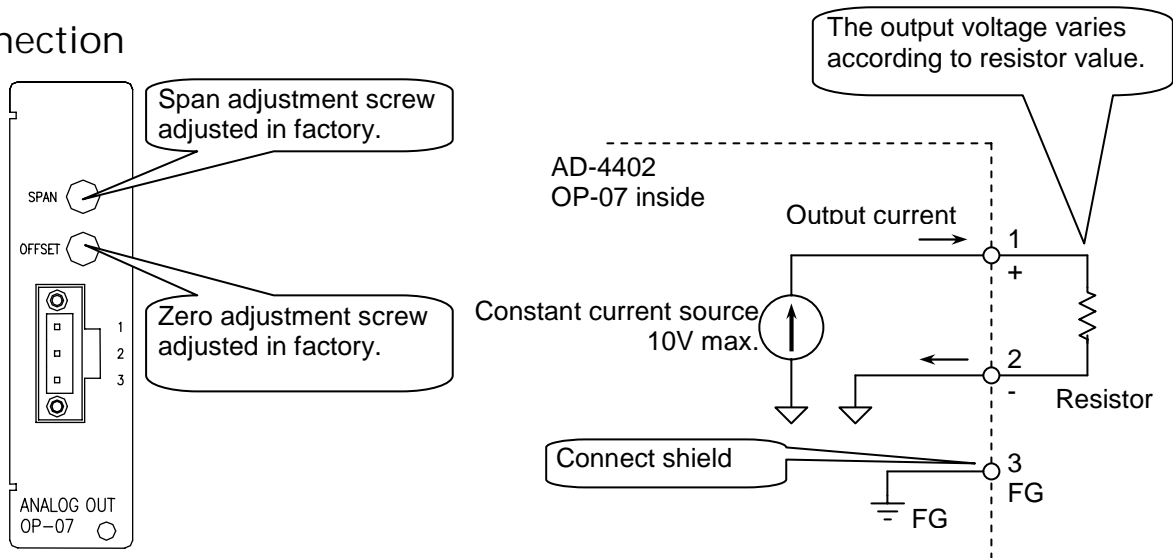


## 8.9. Analog Output of Option OP-07

- This option outputs DC current that is proportion to the display value.  
Factory adjusted to 4 mA output at zero display and 20 mA output at full scale.

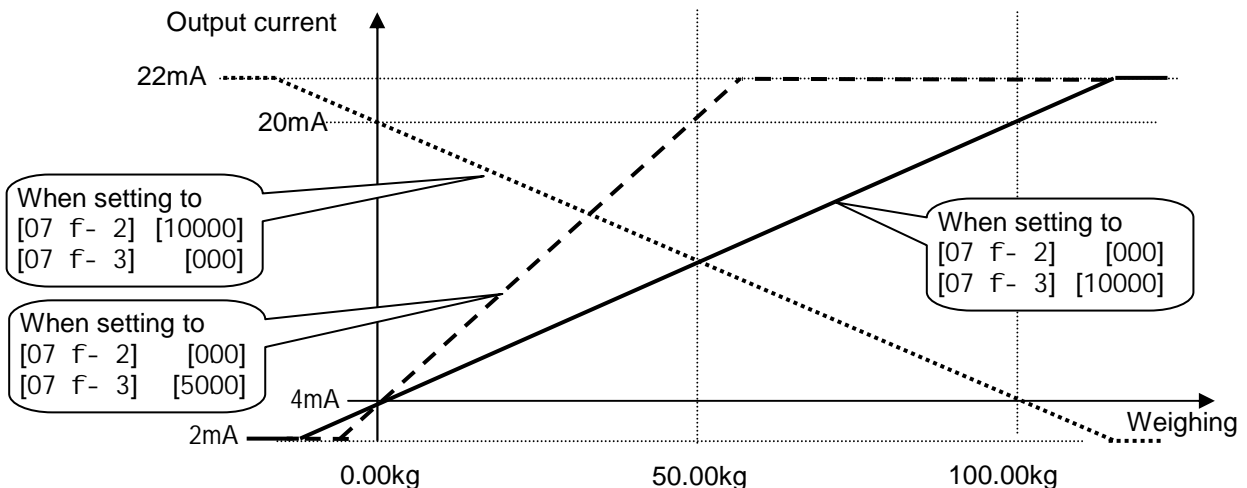
Analog output	Contact to ground
Output voltage	11 V DC min.
Adaptable resistance	0 Ω ~ 500 Ω
Update ratio	100 times per second with Sampling frequency divider [genf- 3]
Zero temperature coefficient	±150 ppm/°C max.
Span temperature coefficient	±150 ppm/°C max.
Non-linearity	0.1% max.
Resolution	Smaller value of either 1/40000 or resolution of display

### Connection



### Settings of Parameters

Refer to "10.4. Parameter List" of the function list.





## 9. Maintenance

### 9.1.1. Basic Operation

- |  |  |
|--|--|
| To enter the maintenance function                    | Press and hold the <b>ENTER</b> key and press the <b>↵</b> key in the weighing mode.<br>Select the menu maintenance using the <b>↵</b> key and the <b>ENTER</b> key. |
| To select an address of the parameter                | The <b>↵</b> , <b>SHIFT + ↵</b> , <b>ENTER</b> , <b>ESC</b> keys.  |
| To change the parameter                              | The <b>↵</b> , <b>SHIFT + ↵</b> , <b>Alphanumerical</b> , <b>ENTER</b> , <b>ESC</b> keys.  |
| To exit the mode<br>(To return to the weighing mode) | The <b>ESC</b> key.  |

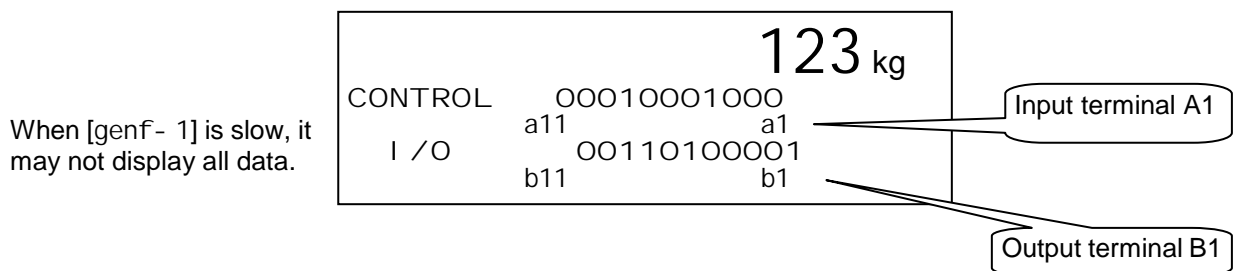


## 9.2. Monitor Mode

- The monitor mode is used to check the indicator during the weighing sequence.

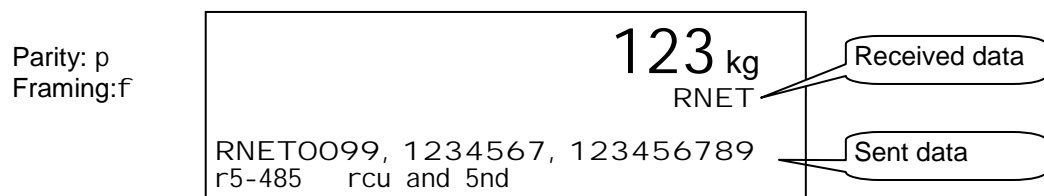
### 9.2.1. Monitoring the Control I/O Function

- Used to monitor the status of the I/O terminals.



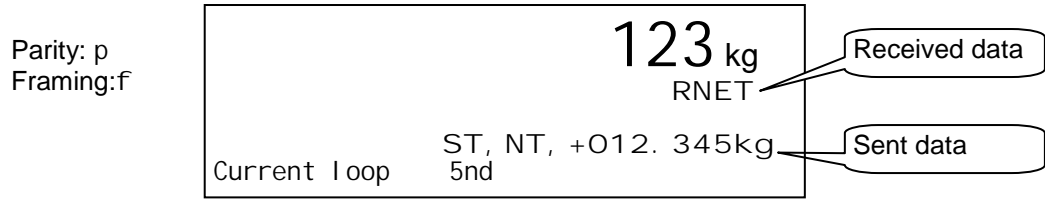
### 9.2.2. Monitoring the Built-in RS-485 Interface

- The current communication data is displayed.



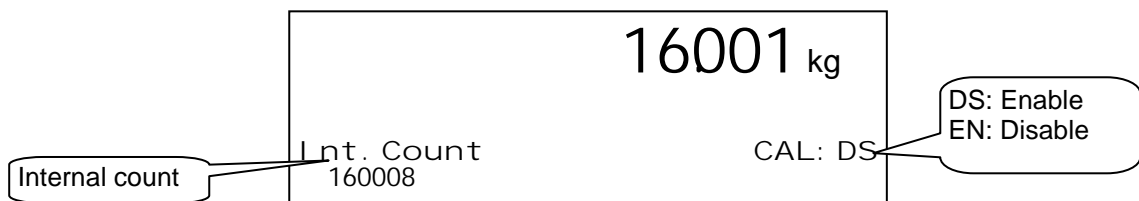
### 9.2.3. Monitoring the Built-in Current Loop Output

- The current communication data is displayed.



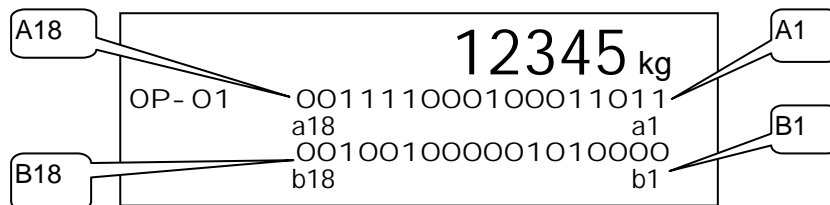
### 9.2.4. Monitoring the A/D Converter

- The current A/D converter data is displayed.



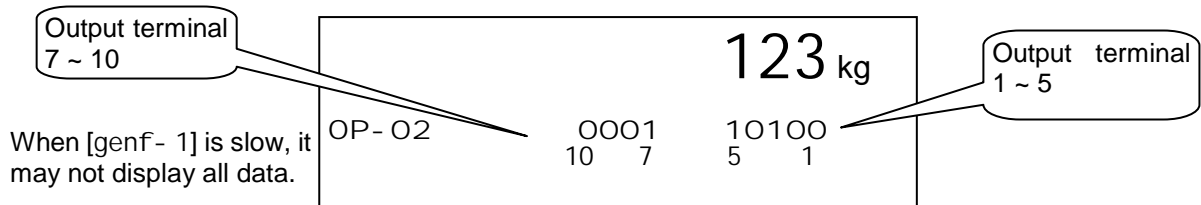
### 9.2.5. Monitoring the BCD Output of OP-01

- The current BCD output data is displayed.



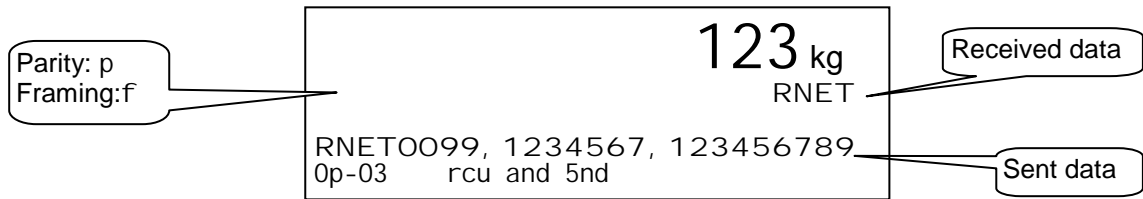
### 9.2.6. Monitoring the Relay Output of OP-02

- The status of the current relay outputs is displayed.



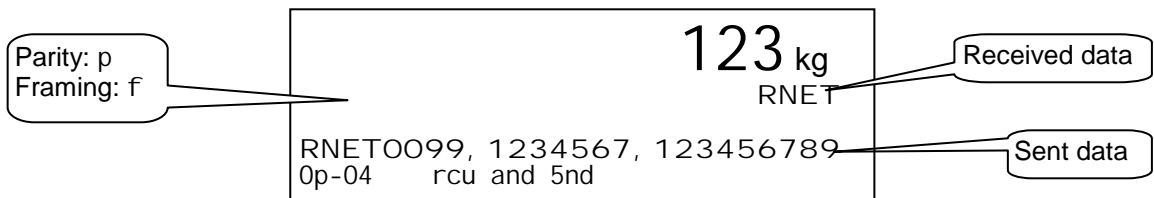
## 9.2.7. Monitoring the RS-422/485 Interface of OP-03

- The current communication data is displayed.



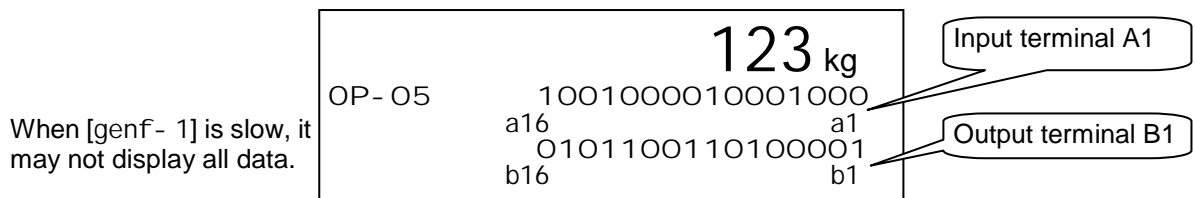
## 9.2.8. Monitoring the RS-232C Interface of OP-04

- The current communication data is displayed.



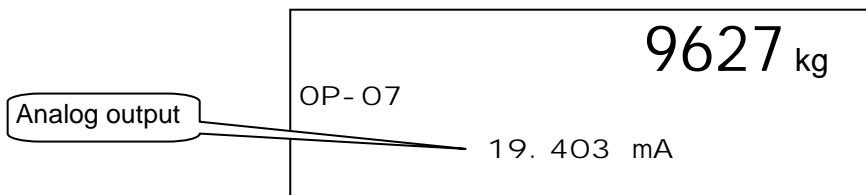
## 9.2.9. Monitoring the Parallel I/O of OP-05

- The status of current parallel I/O is displayed.



## 9.2.10. Monitoring the Analog Output of OP-07

- The current communication data is displayed.





## 9.3. Test Mode

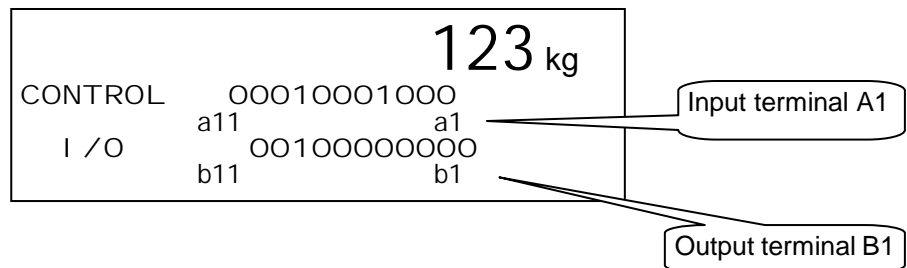
- The test mode is used to check the indicator and weighing system with a test signal.
- When the test mode is used, the weighing sequence is stopped.

### Caution

- **The test mode outputs a test signal. Therefore, the devices connected to system are influenced and it may cause mis-operation.**

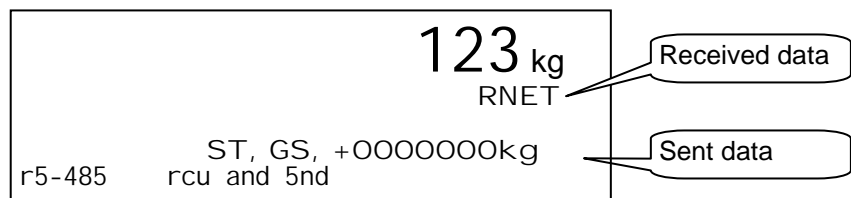
### 9.3.1. Testing the Control I/O Function

- Tests the output of the I/O terminals. An active output of level "1" shifts for each terminal.



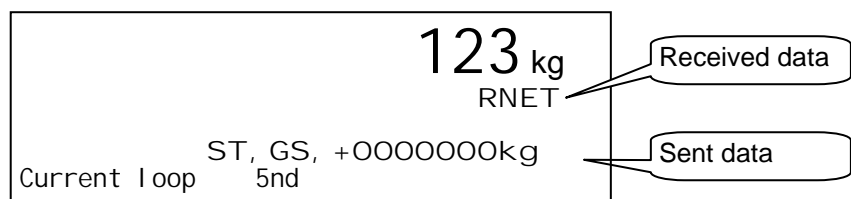
### 9.3.2. Testing the Built-in RS-485 Interface

- When pressing the **ENTER** key each time, the test data "ST,GS,+0000000kg CR LF" is output.



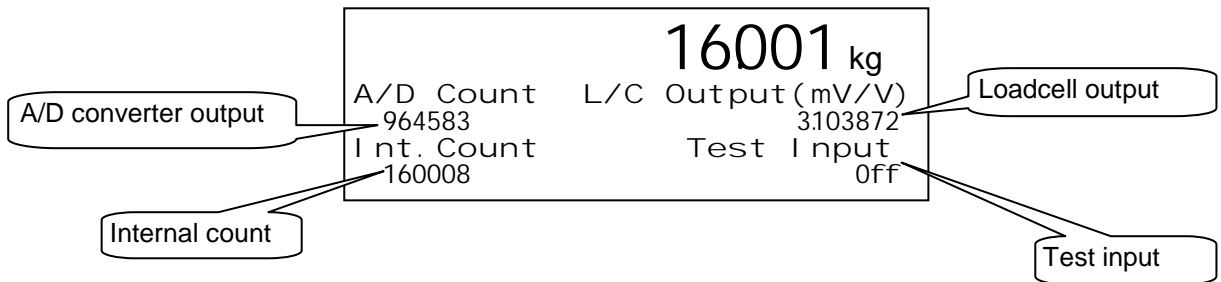
### 9.3.3. Testing the Built-in Current Loop Output

- When pressing the **ENTER** key each time, the test data "ST,GS,+0000000kg CR LF" is output.



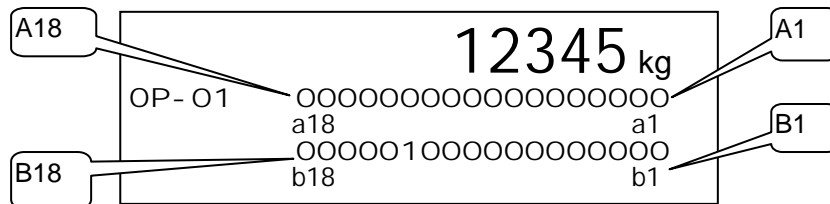
### 9.3.4. Testing the A/D Converter

- The A/D converter data is displayed.
- When pressing the **ENTER** key, a test voltage can be input to the A/D converter.



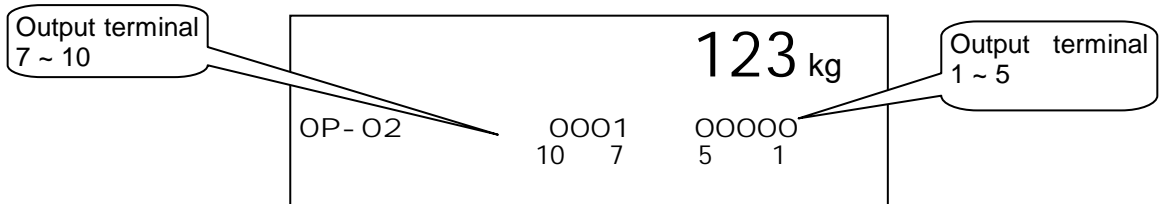
### 9.3.5. Testing the BCD Output of OP-01

- Tests the output of the terminals. An active output of level "1" shifts for each terminal.



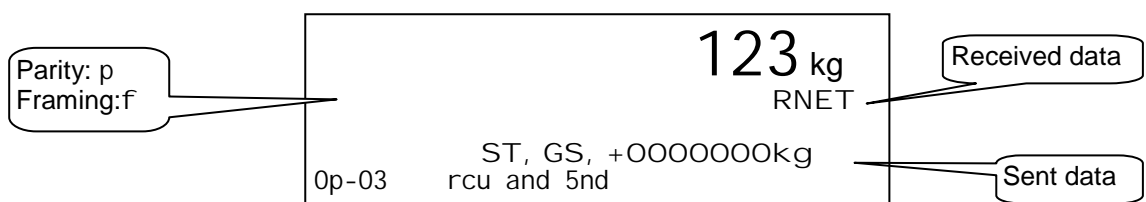
### 9.3.6. Testing the Relay Output of OP-02

- Tests the output of the terminals. An active output of level "1" shifts for each terminal.



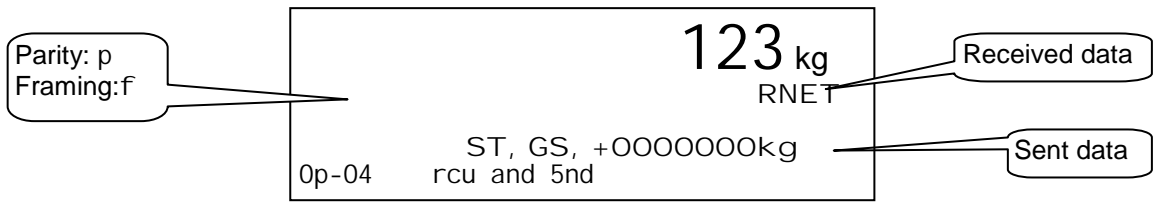
### 9.3.7. Testing the RS-422/485 Interface of OP-03

- When pressing the **ENTER** key each time, the test data "ST,GS,+0000000kg CR LF" is output.



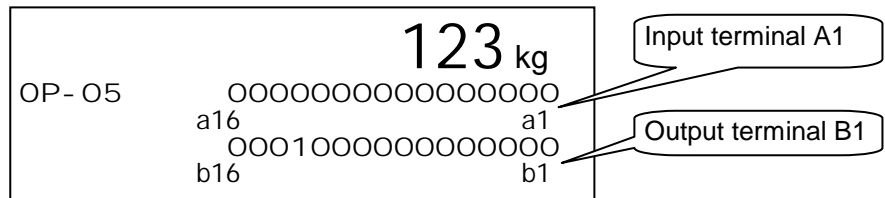
### 9.3.8. Testing the RS-232C Interface of OP-04

- When pressing the **ENTER** key each time, the test data "ST,GS,+0000000kg CR LF" is output.



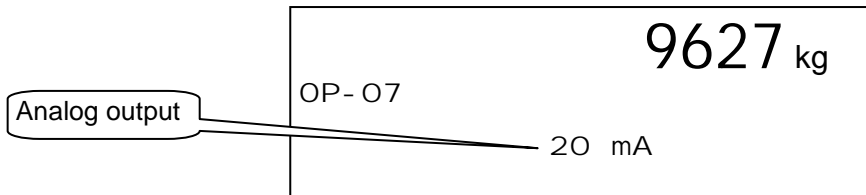
### 9.3.9. Testing the Parallel I/O of OP-05

- Test the output of the terminals. An active output of level "1" shifts for each terminal.



### 9.3.10. Testing the Analog Output of OP-07

- When pressing the **1** key, the output current is increased.
- When pressing the **2** key, the output current is decreased.





## 9.4. Initializing Parameters

- This function initializes the parameters stored in the indicator.
- The parameters are stored in the flash memory and backup RAM.

### Caution

- **There are reset functions that require re-calibration of the indicator**
- **Note where the parameters are stored.**

### Kinds of initialization mode

Kinds of initialization	Description
Initializing RAM	The backup RAM is reset. Zero point of the gross display, tare value zeroes.
Initializing material code or recipe code	Material code and recipe code is reset.
Initializing the function list	Resets parameters of the function list in flash memory.
Initializing caribration data	Resets parameters of calibration data in flash memory. If this function is used, calibrate the indicator.
Initializing all parameters	Resets all parameters, calibrate the indicator.s

### The location of the parameters and objects of initialization mode

		Zero	Tare	Material code		Recipe code		Function list	Calibration data
				Material code	Total data	Recipe code	Total data		
Location	Backup RAM	○	○	○	○	○	○		
	Flash memory			○		○		○	○
Initialization mode	Initializing RAM	○	○						
	Initializing material code or recipe code			○	○	○	○		
	Initializing the function list							○	
	Initializing caribration data								○
	Initializing all parameters	○	○	○	○	○	○	○	○



## Prucedure

### Caution

- **Do not initialize them while in operation. Cut off the power supply of other systems. When initializing the indicator, the output may change.**
- **When initializing the indicator, do not turn it off before it is reset.**

### To enter initialization

- Step 1 Press and hold the **ENTER** key and press the **↵** key to display the menu in a weighing mode.
- Step 2 Select the menu "**Initialization**" using the **↵** key, **ENTER** key and **ESC** key. Category address: [Maintenance] - [Initialization]

### To enter initialization

- Step 1 Select the menu initialization using the **↵** key, **ENTER** key and **ESC** key.  
Menu: RAM / Code / Function / CAL / All
- Step 2 Select "**yes**" to initialize them using the **↵** key, **ENTER** key.
- Step 3 Wait for the indicator to reset.



## 9.5. Remote Operation

- This mode can read and write the parameters of the function list, data of the material code and recipe code and calibration data.
- The built-in RS-485, RS-422/485 (OP-03) or RS-232C (OP-04) is used for remote operation.
- It is necessary to install the **remote setup program** in the computer or controller before use. Refer to <http://www.aandd.co.jp>
- Refer to the instruction manual for details of the program.

### Caution

**Do not download data during a weighing operation.**  
**Remove all connections to prevent an irregular operation.**  
**Maintain the power supply during the remote operation.**

### Entering the Remote Operation Mode

Step 1 Press and hold the **ENTER** key and press the **↵** key.

Step 2 Press the **↵** key to select menu `remote operation`. And press the **ENTER** key.

### Advise

The following RS-232C to RS-485 converter can be used.  
AD-7491, or other converters on the market.

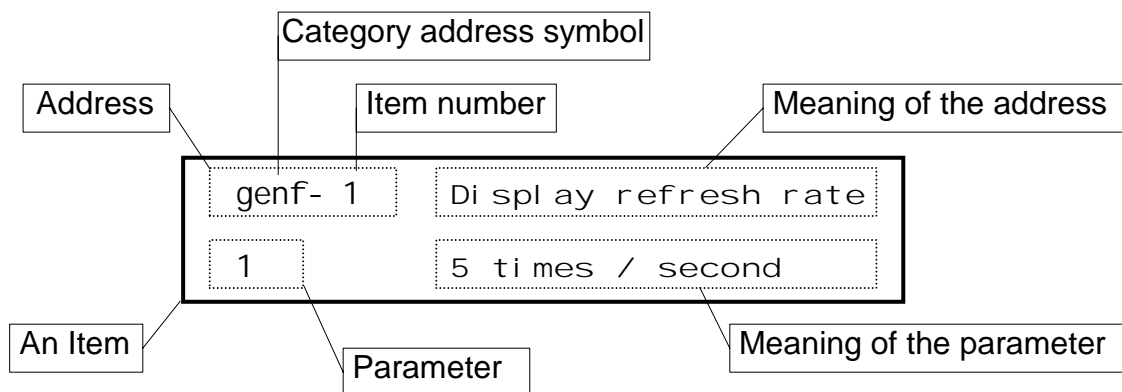


# 10. Function List

- The function list stores parameters to control the indicator.
- The parameters are stored in an item even without power supplied.
- An item is classified by a category address, and is further classified by an item number.  
Refer to " 10.1.2. Outline of the Function List".
- The category address has a symbol for the 7-segments display
- There are two kind of the function modes to operate the function list.
  - Parameter settings                      This mode is used to change the parameter.
  - Referring parameters                    This mode is used to refer the parameter in the weighing sequence.

Example of an item:

Category address: [Function] - [Function setting] - [General] - [Weighing]



## Caution

- **When entering Parameter settings of the function mode, the current weighing sequence is stopped.**

### 10.1.1. Operation Keys

To enter the function list	Press and hold the <b>ENTER</b> key and press the <b>↵</b> key in the weighing mode. Select the menu Function using the <b>↵</b> key and the <b>ENTER</b> key.
To select the parameter address	The <b>↵</b> , <b>SHIFT + ↵</b> , <b>ENTER</b> , <b>ESC</b> keys.
To change the parameter	The <b>↵</b> , <b>SHIFT + ↵</b> , <b>Alphanumerical</b> , <b>ENTER</b> , <b>ESC</b> keys.
To store it and exit the function list (To return to weighing mode)	The <b>ESC</b> key.

## 10.1.2. Outline of the Function List

Category Address	Start Item
Function	
Function reference	
General	
Weight	genf- 1
Sub display	5ub f 1
Other	othf- 1
Sequence	
Basic	5) f- 1
Control	5) f-11
Timer	5) f-31
Setpoint (Comparison value)	5) f-51
Total (Accumulation)	5) f-61
Safety	5) f-71
Control I/O	
Input	1n f- 1
Output	Outf- 1
Serial interface	
Current Loop	Cl f- 1
RS-485	r5 f- 1
Option	
Slot1	Refer to options below.
Slot2	
Slot3	
Function setting	
The same as the "Function reference".	

### Options

Category Address	Start Item
Option	
Slot nn (nn: Slot number for the option to be installed in)	
BCD output, OP-01	01 f- 1
Relay output, OP-02	02 f- 1
RS-422/485, OP-03	03 f- 1
RS-232C, OP-04	04 f- 1
Parallel I/O, OP-05	05 f- 1
Analog output, OP-07	07 f- 1



## 10.2. Referring Parameters

- Use this mode to refer to the parameter in the weighing sequence.
- The mode can change the parameters concerning the digital filter and weighing sequence timers in the weighing sequence.

[genf- 2]          Digital filtering  
                         [Function] - [Function setting] - [General] - [Weighing]

[genf- 3]          Sampling frequency divisor  
                         [Function] - [Function setting] - [General] - [Weighing]

[5q f-31] to [5q f-48]  
                         Weighing sequence timers  
                         [Function] - [Function setting] - [Sequence] - [Timer]



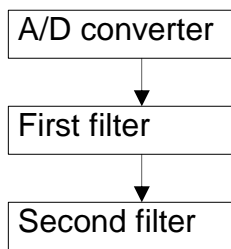
## 10.3. Parameter Settings

- Use this mode to change the parameters.
- The weighing sequence and the I/O interfaces are stopped and closed during this mode.
- New parameters are effective after returning to the weighing mode.



## 10.4. Parameter List

Category address: [Function] - [Function setting] - [General] - [Weighing]

Category address symbol	Name	Descriptions	Range and choices	Default
genf- 1	Display refresh rate	1: Five times per second 2: Ten times per second	1 to 2	2
genf- 2	Digital filter	0: Not used    Select 3dB band for two low pass filters. 1: 11 Hz 2: 8.0 Hz 3: 5.6 Hz 4: 4.0 Hz 5: 2.8 Hz 6: 2.0 Hz 7: 1.4 Hz 8: 1.0 Hz 9: 0.7 Hz 	0 to 99 4 8	
genf- 3	Sampling frequency divider	Use to decrease the cut-off frequency of the digital filter.	0 to 10	1
genf- 4	Stability detection time	The detection condition concerning stability.	0.0 to 9.9 s	1.0 s
genf- 5	Stability detection band width	0.0 : stable at anytime.	0.0 to 9.9 d	2.0 d
genf- 6	Zero Range	The range to zero the gross display. Center of range is zero calibration. Unit: percentage of weighing capacity.	0 to 30 %	5 %
genf- 7	Zero tracking time	The function automatically traces the weighing deviation at nearly zero point and keeps zero display of gross display.	0.0 to 9.9 s	0.0 s
genf- 8	Zero tracking band width		0.0 to 9.9 d	0.0 d
genf- 9	Tare and zero compensation at unstable status	When unstable weighing, whether zero or tare command is used. 0 :Disabled 1 :Enabled	0 to 1	1
genf-10	Tare at negative GROSS weight	When negative weighing, whether tare command is used. 0 :Prohibit tare. 1 :Permission to tare.	0 to 1	1
genf-11	Preset tare	Preset tare of material code 0 :Not used 1 :Use	0 to 1	1
genf-12	Preset tare =0 choice	1: If tare value of material code is zero, the last tare value is used. 2: If tare value of material code is zero, Tare is set to zero.	1 to 2	1

Category address symbol	Name	Descriptions	Range and choices	Default
genf-13	Clear mode at power ON	The action at turning the indicator on. First bit: Zero Second bit: Zero clear Third bit: Tare Fourth bit: Tare clear  0: Not used 1: Use	0000 to 1111	0000
genf-14	Hold function	1: Hold 2: Hold at batch finish 3: Hold at recipe finish	1 to 3	1

**s** : second  
**d** : digit

Category address: [Function] - [Function setting] - [General] - [Sub-display]

Category address symbol	Name	Descriptions	Range and choices	Default
5Ubf- 1	Weighing display	0: Basic format 1: Custom format	0 to 1	0

When custom format is used (When [5Ubf- 1] [1] ), set items to be displayed in the sub-display.

Item index number to be displayed. 32 items of name and number can be set in maximum.  
**Odd:** Input the name of the selected item using alphanumeric characters.  
**Even:** Input the number concerning the item.

5ub f 1

Sub F1-3 [ name]

hopper /Row/Col /Di g

19 0 16 5

Name of the item

Information of key operation

Resize the item selected.

Number	Name and Number to Display the Item	Row size	Columnsize	Figures
0	Not displayed			
1	Material			
2	Hopper			
3	Final			
4	Free fall			
5	Preliminary			
6	Optional preliminary			
7	Over			
8	Under			
9	Zero Band			
10	Full (full filling)			
11	Tare			
12	Supplementary flow open timer			
13	Supplementary flow close timer			
14	Automatic Free Fall Compensation			
15	Internal reserved			
16	Internal reserved			
17	IDF at initial flow sequence			
18	MDF at initial flow sequence			
19	Total weight			
20	Total count			
21	Recipe , rCode			
22	Total weight for recipe mode			
23	Total count for recipe mode			



Category address: [Function] - [Function setting] - [General] - [Sub-display]

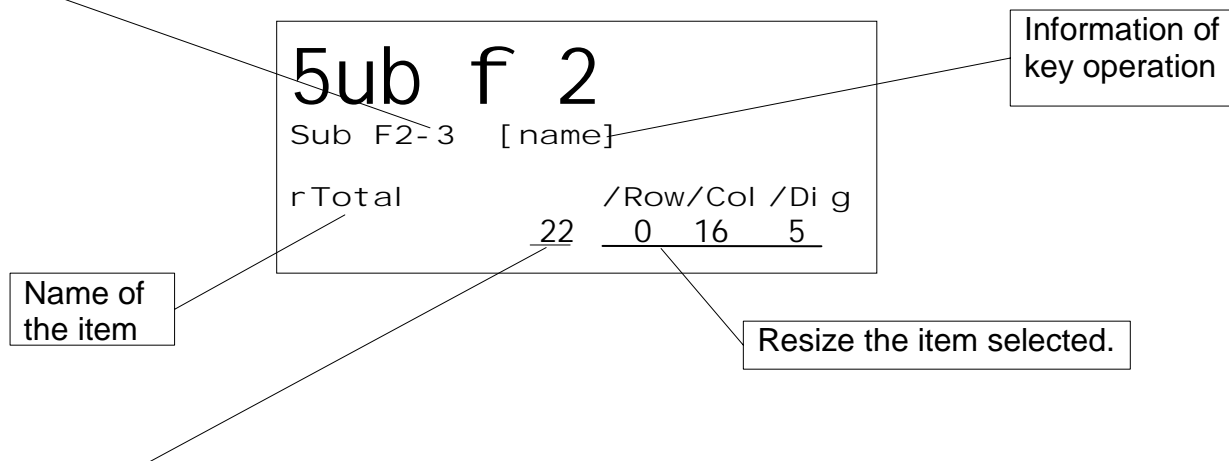
Category address symbol	Name	Descriptions	Range and choices	Default
5Ubf- 2	Recipe display	0: Basic format 1: Custom format	0 to 1	0

When custom format is used (When [5Ubf- 2] [1] ), set items to be displayed in the sub-display.

Item index number to be displayed. 32 items of name and number can be set in maximum.

**Odd:** Input the name of the selected item using alphanumeric characters.

**Even:** Input the number concerning the item.



Number	Name and Number to Display the Item	Row size	Columnsize	Figures
0	Not displayed	0 to 3	0 to26	1 to12
22	Total weight for recipe mode			
23	Total count for recipe mode			

Category address: [Function] - [Function setting] - [General] - [Sub-display]

Category address symbol	Name	Descriptions	Range and choices	Default
5ub f 1	Refer to previous pages.			
5ub f 2				
5ub f 3	Bar graph location	0: Hide 1: Upper side. 2: Lower side.	0 to 2	0
5ub f 4	Ratio of graph display	1: Gross weight to capacity. 2: Net weight to final value.	0 to 2	1
5ub f 5	Activity indicator	0: Off (Not used) 1: On (Use)	0 to 1	1

Category address: [Function] - [Function setting] - [General] - [Others]

Category address symbol	Name	Descriptions	Range and choices	Default
othf- 1	Key lock	Set the action of each key. Bit 1: F1 key Bit 2: F2 key Bit 3: F3 key Bit 4: F4 key Bit 5: Code recall key Bit 6: Code set key Bit 7: Not defined Bit 8: Zero key Bit 9: Tare key Bit 10: Net / Gross key Bit 11: Not defined Bit 12: Off key  0: Unlock 1: Lock	0000000 00000 to 1111111 11111	00000 00000 00

Category address symbol	Name	Descriptions	Range and choices	Default
othf- 2	F1 key function	0: Not used 1: Display exchange (current weighing / recipe) 2: Manual print 3: Hold 4: Zero clear ( to be zero) 5: Tare clear ( to be zero) 6: Batch start	0 to 24	0
othf- 3	F2 key function	7: Recipe start 8: Discharge 9: Mixing 10: Pause 11: Internal reserved 12: Restart 13: Forced batch finish 14: Forced recipe finish		
othf- 4	F3 key function	15: Forced discharge finish 16: Total command 17: Manual free fall compensation 18: Cancel the last result 19: Error reset 20: Clear the total weight and count for each material code.		
othf- 5	F4 key function	21: Clear the total weight and count for each recipe code. 22: Clear all total data for material codes. 23: Clear all total data for recipe codes. 24: Clear all total data of material code and recipe code.		
othf- 6	Parallel I/O Buzzer	Buzzer output is 2 s. Beep is 0.2 s used in Contolol I/O, OP-02, OP-05. Bit 1: Beep (Click sound) Bit 2: Over Bit 3: OK Bit 4: Under Bit 5: Zero band Bit 6: Batch finish Bit 7: Discharge finish Bit 8: Recipe finish Bit 9: Mixing finish Bit 10: Weighing sequence in process Bit 11: Full (Full filling) Bit 12: Stable condition Bit 13: Weighing sequence error Bit 14: Alarm 1 Bit 15: Alarm 2 Bit 16: Zero error  0: Off (Not used: Open) 1: On (Use: Short or Open)		

Category address symbol	Name	Descriptions	Range and choices	Default
othf- 7	Tare Header	Use for the current loop output or RS-485 of serial interface. This parameter can not be used in command mode or stream mode. 0: All tare header of tare is "TR" 1: Use "PT" for preset tare header and "T" of tare header	0 to 1	0
othf- 8	Preset tare printing with net weight	Use for the current loop output or RS-485 interface at net display. This parameter can not be used in command mode or stream mode. 0: No (Preset tare not output) 1: Yes (To output preset tare)	0 to 1	0
othf- 9	Printing when unstable condition	Use for the current loop output or RS-485 interface at "out of range" or "unstable condition". 0: No 1: Yes	0 to 1	0
othf-10	Repeat lock	The function to avoid key operation error. Bit 0: Total Bit 1: Manual print operaton  0: Unlock 1: Lock (Cancel duplicated command input)	00 to 11	00
othf-11	Save data	Select a backup method for material code and recipe code. 0: Store in RAM 1: Store in flash memory	1 to 2	1

Category address: [Function] - [Function setting] - [Sequence] - [Basic]

Category address symbol	Name	Descriptions	Range and choices	Default
5q f- 1	Weighing mode	1: Customer programmed control mode 2: Built-in automatic program mode	1 to 2	2
5q f- 3	Loss-in-weigh	0: Normal batch weighing 1: Loss-in-weigh 2: External exchange	0 to 2	0
5q f- 4	Setpoint comparison	0: Comparison with internal count 1: Comparison with display count	1 to 2	1
5q f- 5	Comparison	0: Always output 1: Stable condition 2: At batch finish	0 to 2	2
5q f- 7	Output of zero band	0: Gross <= Zero band 1:   Gross   <= Zero band	1 to 2	1
5q f- 8	Recipe mode	0: recipe sequence not used 1: Semi-automatic mode 2: Automatic mode	0 to 2	0
5q f- 9	Material code, free fall value	The selection to store free fall value on the automatic free fall compensation or realtime free fall compensation. 0: No change Even if automatic free fall compensation is used, parameter of the free fall stored in the material code is not changed. 1: Change free fall value The result is stored in the parameter of the free fall in the material code.	0 to 1	0

Category address: [Function] - [Function setting] - [Sequence] - [Control]

Category address symbol	Name	Descriptions	Range and choices	Default
5q f-11	Batch start settings	<p>Select an action at starting the weighing sequence.</p> <p>Bit 1: When loading it above zero band, start the sequence.</p> <p>Bit 2: Not used</p> <p>Bit 3: Automatic tare at the starting sequence</p> <p>0: No (Does not work) 1: Yes (Works)</p>	000 to 111	000
5q f-12	Nozzle control	<p>Bit 1: Use nozzle control. "Nozzle down" operation signal is output at starting the sequence.</p> <p>Bit 2: Nozzle contact stop sequence Use start delay timer to prevent weighing error at touching the hopper.</p> <p>Bit 3: "Nozzle up" after compensate.</p> <p>0: No (Not used) 1: Yes (Use)</p>	000 to 111	000
5q f-13	Eval conditions	<p>After dribble flow, select the stability condition of comparison. Refer to Eval delay timer [5qf-37].</p> <p>0: Timer is up Compare when time is up.</p> <p>1: Stable and timer is up Compare when weighing is stable and the time is up.</p> <p>2: Stable or timer is up Compare when weighing is stable or the time is up.</p>	0 to 2	1

Category address: [Function] - [Function setting] - [Sequence] - [Control]

Category address symbol	Name	Descriptions	Range and choices	Default
5q f-14	Batch finish actions	Select an action at batch finish. Bit 1: Auto-start mixing (Start mixing automatically) Bit 2: Auto-start discharge (Start discharge automatically)  0: No (Not used) 1: Yes (Use)	00 to 11	00
5q f-15	Discharge finish actions	Select an action at discharge finish. Bit 1: Auto-clear tare (Clear tare automatically) Bit 2: Start mixing (Start mixing automatically)  0: No (Not used) 1: Yes (Use)	00 to 11	00
5q f-16	Recipe start actions	Selection of re-zeroing at recipe start. 0: No (Not used) 1: Yes (Use)	0 to 1	1
5q f-17	Recipe finish actions	Select an action at recipe finish. Bit 1: Auto-clear tare (Clear tare automatically) Bit 2: Auto-start mixing (Start mixing automatically) Bit 3: Auto-start discharge. (Start discharge automatically)  0: No (Not used) 1: Yes (Use)	000 to 111	000
5q f-18	Maximum number of compensation	Set the number of compensation flow. When 0 is set, there is no flow.	0 to 255	0
5q f-19	Comparison flow Eval	Set the condition with compensation close timer and stability. 0: Timer is up Comparison when compensation close timer is up. 1: Stable and timer is up. Comparison after stable mark and compensation close timer is up. 2: Stable or timer is up. Comparison after stable mark or compensation close timer is up.	0 to 2	0
5q f-20	Free fall compensation	0: No (Not used) 1: Average of last four free fall times. 2: Real time free fall compensation	0 to 2	0

Category address symbol	Name	Descriptions	Range and choices	Default
5q f-21	Batch finish output off	0: Off at next start (Turning off until next start) 1: Off at over or unstable. (Turning off when "out of range" or "unstable condition") 2: Off at zero band. (Turning off at zero band)	0 to 2	0

Category address: [Function] - [Function setting] - [Sequence] - [Timer]

Category address symbol	Name	Descriptions	Range and choices	Default
5q f-31	Batch monitoring timer	Set the upper limit of the time of sequence. If the sequence is not finished, sequence error SQ. ERR4 is displayed. If 0 is set, the timer does not work.	0 to 65535 s	0 s
5q f-32	Batch start delay timer	Set the delay time between start operation and the flow start	0.0 to 65535 s	0.0 s
5q f-33	Full flow comparison interrupt timer	The timer to prevent weighing error due to vibration of open/close operation. While the timer is not up, the comparison does not work.	0.0 to 25.5 s	0.0 s
5q f-34	Medium flow comparison interrupt timer		0.0 to 25.5 s	0.0 s
5q f-35	Dribble flow comparison interrupt timer		0.0 to 25.5 s	0.0 s
5q f-36	Dribble flow auto-Free Fall override	Set the time until the dribble flow can start. Use to prevent compensation error of automatic free fall compensation or real time free fall compensation.	0.0 to 25.5 s	3.0 s
5q f-37	Eval delay timer	Set the time between closing dribble flow and comparing the result. Refer to Eval conditions [5q f-13]	0.1 to 25.5 s	0.1 s
5q f-38	Discharge start delay timer	Set the time between operating discharge start and opening the discharge gate	0.0 to 25.5 s	0.0 s



Category address symbol	Name	Descriptions	Range and choices	Default
5q f-39	Discharge monitoring timer	Set the time limit to discharge it When time is up and displayed value is not zero band, sequence error SQ. ERR5 is displayed. If 0 is set, the timer does not work.	0 to 65535 s	0 s
5q f-40	Discharge gate close delay timer	Set the waiting time from reaching to zero band to closing discharge gate for gross.	0.1 to 25.5 s	0.1 s
5q f-43	Batch finish output on	Set the active (ON) time of the batch finish signal. If 0 is set, output is kept until next sequence.	0.00 to 2.55 s	0.00 s
5q f-44	Discharge finish output on	Set the active (ON) time of the ON for the discharge signal.	0.00 to 2.55 s	0.00 s
5q f-45	Recipe finish output on	Set the active (ON) time of the ON for the recipe finish signal.	0.00 to 2.55 s	0.00 s
5q f-46	Mixing finish output on	Set the active (ON) time of the ON for the mixing finish signal.	0.00 to 2.55 s	0.00 s
5q f-47	Mixing time output on	Set the active (ON) time of the ON for the mixing time signal.	0 to 255 s	0 s
5q f-48	Averaging Eval time	Set the time to average the result. This time controls precision of the result. Refer to Eval delay timer [5q f-37] and Eval conditions [5q f-13].	00.0 to 2.55 s	0.00 s

**s** : second  
**d** : digit

Category address: [Function] - [Function setting] - [Sequence] - [Setpoint]

Category address symbol	Name	Descriptions	Range and choices	Default
5q f-51	Code recall method	1: Key operation (including serial interface, field bus) 2: Parallel interface (Digital switch) 3: External switch	1 to 3	1
5q f-53	Hide elements of material code	Select the parameter to hide of material code. Bit 1: Free fall Bit 2: Preliminary Bit 3: Optional preliminary Bit 4: Over Bit 5: Under Bit 6: Zero band Bit 7: Full Bit 8: Tare Bit 9: Compensation flow open timer Bit 10: Compensation flow close timer Bit 11: AFFC range Bit 12: Initial dribble flow Bit 13: Initial dribble flow  0: Show 1: Hide	0000000 000000 to 1111111 111111	00000 00000 000
5q f-55	Add Final value and zero band	0: No (Not added) 1: Yes (Add)	0 to 1	1
5q f-56	Add Final value and Full value	0: No (Not added) 1: Yes (Add)	0 to 1	1

Category address: [Function] - [Function setting] - [Sequence] - [Total]

Category address symbol	Name	Descriptions	Range and choices	Default
5q f-61	Automaic material code total	0: Not totaled automatically 1: Auto-total OK results To total OK result automatically 2: Auto-total all results To total all result automatically	0 to 2	0
5q f-62	Automaic recipe code total	0: No (Not totaled) 1: Yes (Total the result)	0 to 1	0

Category address: [Function] - [Function setting] - [Sequence] - [Safety]

Category address symbol	Name	Descriptions	Range and choices	Default
5q f-71 to 5q f-75		<p>The maximum eight inputs for safety check are assigned to the I/O or OP-05. If an input is inactive, the sequence is stopped and displays sequence error. Refet to 7.5.11. Error Message and Alarm. These safety checks can be used during the sequence.</p> <p>Bits map            Bit 1: Safety input 1            Bit 2: Safety input 2            Bit 3: Safety input 3            Bit 4: Safety input 4            Bit 5: Safety input 5            Bit 6: Safety input 6            Bit 7: Safety input 7            Bit 8: Safety input 8</p> <p>0: No (Not used)            1: Yes (Use)</p>		
5q f-71	Batching safety check	If the assigned input is inactive during the weighing sequence, a sequence error occurs.	0000000 0 to 1111111 1	00000 000
5q f-72	Discharge safety check	If the assigned input is inactive during the discharge sequence, a sequence error occurs.		
5q f-73	Recipe safety check	If the assigned input is inactive during the recipe sequence, a sequence error occurs.		
5q f-74	Mixing safety check	If the assigned input is inactive during the mixing sequence, a sequence error occurs.		
5q f-75	General safety check	If the assigned input is inactive during all sequences, a sequence error occurs.		

Category address: [Function] - [Function setting] - [Control I/O Function] - [Input]

The list to assign the function for the input terminal of the I/O

No.	Function description	Read	No.	Function description	Read
0	No function	-	26	Clear totals of active recipe code	Edge
1	Zero	Edge	27	Clear totals of all recipe code	Edge
2	Zero clear	Edge	28	Safety check input 1	Level
3	Tare	Edge	29	Safety check input 2	Level
4	Tare clear	Edge	30	Safety check input 3	Level
5	Batch start	Edge	31	Safety check input 4	Level
6	Recipe start	Edge	32	Safety check input 5	Level
7	Discharge start	Edge	33	Safety check input 6	Level
8	Mixing	Edge	34	Safety check input 7	Level
9	External switch control 0: Normal batch 1: Loss-in-weigh	Level	35	Safety check input 8	Level
10	Manual free fall compensation	Edge	36	Forced batch finish	Edge
11	Total command	Edge	37	Forced recipe finish	Edge
12	Cancel the last result	Edge	38	Forced discharge finish	Edge
13	Emergency stop	Level	39	Manual full flow	Level
14	Material / Recipe code, BCD 1	Level	40	Manual medium flow	Level
15	Material / Recipe code, BCD 2	Level	41	Manual dribble flow	Level
16	Material / Recipe code, BCD 4	Level	42	Manual discharge	Level
17	Material / Recipe code, BCD 8	Level	43	Manual mixing	Level
18	Material / Recipe code, BCD 10	Level	44	Error reset	Edge
19	Material / Recipe code, BCD 20	Level	45	Hold	Level
20	Material / Recipe code, BCD 40	Level	46	Key unlock	Level
21	Material / Recipe code, BCD 80	Level	47	Manual print command	Edge
22	Pause	Edge	48	Code recall external switch control OFF: key, ON: digital switch	Level
23	Restart	Edge	49	Recipe interrupt	Level
24	Clear totals of active material code	Edge	50	Net / gross	Edge
25	Clear totals of all material code	Edge			

Input terminals of the I/O and default functions

Category address symbol	Terminal name	Default choices	Default No.
1n f- 1	Input terminal A1	Zero	1
1n f- 2	Input terminal A2	Tare	3
1n f- 3	Input terminal A3	Tare clear	4
1n f- 4	Input terminal A4	Batch start	5
1n f- 5	Input terminal A5	Emergency stop	13
1n f- 6	Input terminal A6	Material / Recipe code, BCD 1	14
1n f- 7	Input terminal A7	Material / Recipe code, BCD 2	15
1n f- 8	Input terminal A8	Material / Recipe code, BCD 4	16
1n f- 9	Input terminal A9	Pause	22
1n f-10	Input terminal A10	Restart	23
1n f-11	Input terminal A11	Error reset	44

Category address: [Function] - [Function setting] - [Control I/O Function] - [Output]

The list to assign the function for the output terminal of the I/O

No.	Function description	No.	Function description	No.	Function description
0	No function	30	Gross display	60	Material hopper 2 <b>DF</b>
1	Stable	31	Net display	61	Material hopper 3 <b>FF</b>
2	Zero band	32	During hold	62	Material hopper 3 <b>MF</b>
3	Full (Full filling)	33	Internal reservation	63	Material hopper 3 <b>DF</b>
4	Full flow	34	Internal reservation	64	Material hopper 4 <b>FF</b>
5	Medium flow	35	Material hopper 1	65	Material hopper 4 <b>MF</b>
6	Dribble flow	36	Material hopper 2	66	Material hopper 4 <b>DF</b>
7	Over	37	Material hopper 3	67	Material hopper 5 <b>FF</b>
8	OK	38	Material hopper 4	68	Material hopper 5 <b>MF</b>
9	Under	39	Material hopper 5	69	Material hopper 5 <b>DF</b>
10	Internal reservation	40	Material hopper 6	70	Material hopper 6 <b>FF</b>
11	Internal reservation	41	Material hopper 7	71	Material hopper 6 <b>MF</b>
12	Mixing	42	Material hopper 8	72	Material hopper 6 <b>DF</b>
13	Discharge (Open the dscharge gate)	43	Material hopper 9	73	Material hopper 7 <b>FF</b>
14	Batch finish	44	Material hopper 10	74	Material hopper 7 <b>MF</b>
15	Recipe finish	45	Material hopper 11	75	Material hopper 7 <b>DF</b>
16	Discharge finish	46	Material hopper 12	76	Material hopper 8 <b>FF</b>
17	Mixing finish	47	Material hopper 13	77	Material hopper 8 <b>MF</b>
18	Nozzle down	48	Material hopper 14	78	Material hopper 8 <b>DF</b>
19	Online. If sequence is enabled, 0.5 sec. pulse is output.	49	Material hopper 15	79	Material hopper 9 <b>FF</b>
20	Weighing sequence in process	50	Material hopper 16	80	Material hopper 9 <b>MF</b>
21	Input acknowledge. If there is a input signal, 0.5 sec. pulse is output.	51	Material hopper 17	81	Material hopper 9 <b>DF</b>
22	Weighing sequence error	52	Material hopper 18	82	Material hopper10 <b>FF</b>
23	Alram 1	53	Material hopper 19	83	Material hopper10 <b>MF</b>
24	Alram 2	54	Material hopper 20	84	Material hopper10 <b>DF</b>
25	Zero error	55	Material hopper 1 <b>FF</b>		
26	Capacity exceeded (Out of range)	56	Material hopper 1 <b>MF</b>		
27	Buzzer	57	Material hopper 1 <b>DF</b>		
28	During tare	58	Material hopper 2 <b>FF</b>		
29	Center of zero	59	Material hopper 2 <b>MF</b>		

Full flow: **FF**  
 Medium flow: **MF**  
 Dribble flow: **DF**

Output terminals of the I/O and default functions

Category address symbol	Terminal name	Default choices	Default No.
Outf- 1	Output terminal B1	Zero band	2
Outf- 2	Output terminal B2	Full flow	4
Outf- 3	Output terminal B3	Medium flow	5
Outf- 4	Output terminal B4	Dribble flow	6
Outf- 5	Output terminal B5	Over	7
Outf- 6	Output terminal B6	OK	8
Outf- 7	Output terminal B7	Under	9
Outf- 8	Output terminal B8	Batch finish	14
Outf- 9	Output terminal B9	Weighing sequence error	22
Outf-10	Output terminal B10	Alarm 1	23
Outf-11	Output terminal B11	Alarm 2	24

Category address: [Function] - [Function setting] - [Serial] - [RS-485]

Category address symbol	Name	Descriptions	Range and choices	Default
r5 f- 1	Output data	When jet stream mode of communication mode [r5 f- 2] is used, 1, 2 or 3 can be selected. And if freeze mode is used in jet stream mode, output is stopped. 1: Displayed value 2: Gross value 3: Net value 4: Tare value 5: Gross value/ Net value/ Tare value 6: Displayed value with material code 7: Gross value with material code 8: Net value with material code 9: Tare value with material code 10: Gross value/ Net value/ Tare value with material code	1 to 10	1
r5 f- 2	Communication mode	1: Stream mode 2: Auto print mode 3: Manual print mode 4: Print at total 5: Jet stream mode 6: Command mode	1 to 6	6
r5 f- 3	Baud rate	1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps 5: 9600 bps 6: 19200 bps 7: 38400 bps (command mode can not be selected)	1 to 7	5
r5 f- 4	Parity check	0: Not used 1: Odd 2: Even	0 to 2	0
r5 f- 5	Character length	7: 7 bits 8: 8 bits	7, 8	8
r5 f- 6	Stop bits	1: 1 bit 2: 2:bits	1 to 2	1
r5 f- 7	Terminator	1: CR                      CR: 0Dh 2: CR LF                 LF: 0Ah	1 to 2	2
r5 f- 8	Address	0: Address not used 1 to 99: Address used	0 to 99	0
r5 f- 9	Response timer	Set the waiting timer from receiving command to transmitting a response.	0.0 to 25.5 s	0.0 s



Category address: [Function] - [Function setting] - [Serial] - [Current loop]

Category address symbol	Name	Descriptions	Range and choices	Default
Cl f- 1	Output data	1: Displayed value 2: Gross value 3: Net value 4: Tare value 5: Gross value/ Net value/ Tare value 6: Displayed value with material code 7: Gross value with material code 8: Net value with material code 9: Tare value with material code 10: Gross value/ Net value/ Tare value with material code	1 to 10	1
Cl f- 2	Communication mode	1: Stream mode 2: Auto print mode 3: Manual print mode 4: Print at total 5: Jet Stream mode	1 to 4	1
Cl f- 3	Baud rate	1: 600 bps 2: 1200 bps 3: 2400 bps	1 to 3	3
Cl f- 4	Burst rate of continuous output	Set the burst time when gross, net or tare is output continuously. Stream mode uses 0.0 s.	0.00 to 2.55 s	0.00 s

**s:** Second

Category address: [Function] - [Function setting] - [Option] - [slotn] - [OP-01]

OP-01: Option BCD Output

slot n : slot number

Category address symbol	Name	Descriptions	Range and choices	Default
01 f- 1	Out put data	1: Displayed value 2: Gross value 3: Net value 4: Tare value 5: Current material code total 6: Current material code total # 7: Current recipe code total 8: Current recipe code total # 9: Current material code and recipe code 10: Error alarm No.	1 to 10	1
01 f- 3	Communication mode	1: Stream mode 2: Auto print mode 3: Manual print mode 4: Print at total 5: Jet stream mode (each sampling)	1 to 5	1
01 f- 4	Output logic	1: Positive logic 2: Negative logic	1 to 2	2

Category address: [Function] - [Function setting] - [Option] - [slotn] - [OP-02]

OP-02: Option Output Relay Output

slot n : slot number

Category address symbol	Name		Descriptions	Range and choices	Default
02 f- 1	Output terminal 1	1	Material hopper 1 Medium flow	0 to 84	56
02 f- 2	Output terminal 2	2	Material hopper1 Dribble flow	0 to 84	57
02 f- 3	Output terminal 3	3	Material hopper 2 Medium flow	0 to 84	59
02 f- 4	Output terminal 4	4	Material hopper 2 Dribble flow	0 to 84	60
02 f- 5	Output terminal 5	5	Material hopper 3 Medium flow	0 to 84	62
02 f- 7	Output terminal 7	7	Material hopper 3 Dribble flow	0 to 84	63
02 f- 8	Output terminal 8	8	Material hopper 4 Medium flow	0 to 84	65
02 f- 9	Output terminal 9	9	Material hopper 4 Dribble flow	0 to 84	66
02 f-10	Output terminal 10	10	Material hopper 5 Medium flow	0 to 84	69

Default parameters are set to double gates hopper

Category address: [Function] - [Function setting] - [Option] - [slotn] - [OP-03] or  
 [Function] - [Function setting] - [Option] - [slotn] - [OP-04]

OP-03: Option RS-422 / 485 Serial Interface

OP-04: Option RS-232C Serial Interface

slot n : slot number

Category address symbol	Name	Descriptions	Range and choices	Default
03 f- 1 04 f- 1	Output data	When jet stream mode of communication mode [r5 f- 2] is used, 1, 2 or 3 can be selected. And if freeze mode is used in jet stream mode, output is stopped. 1: Displayed value 2: Gross value 3: Net value 4: Tare value 5: Gross value/ Net value/ Tare value 6: Displayed value with material code 7: Gross value with material code 8: Net value with material code 9: Tare value with material code 10: Gross value/ Net value/ Tare value with material code	1 to 10	1
03 f- 2 04 f- 2	Communication mode	1: Stream mode 2: Auto print mode 3: Manual print mode 4: Print at total 5: Jet stream mode 6: Command mode	1 to 6	6
03 f- 3 04 f- 3	Baud rate	1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps 5: 9600 bps 6: 19200 bps 7: 38400 bps (Command mode can not be selected)	1 to 7	5
03 f- 4 04 f- 4	Parity check	0: Not used 1: Odd 2: Even	0 to 2	0
03 f- 5 04 f- 5	Character length	7: 7 bits 8: 8 bits	7, 8	8
03 f- 6 04 f- 6	Stop bits	1: 1 bit 2: 2:bits	1 to 2	1
03 f- 7	Terminator	1: CR CR: 0Dh	1 to 2	2

Category address symbol	Name	Descriptions	Range and choices	Default
04 f- 7		2: CR LF                      LF: 0Ah		
03 f- 8 04 f- 8	Address	0:        Address is not used 1 to 99: Address is used	0 to 99	0
03 f- 9	Response timer	Set the waiting timer from receiving command to transmitting a response.	0.00 to 2.55 <b>s</b>	0.00 <b>s</b>
03 f-11	RS-422 / 485 switch	1: RS-422 2: RS-485	1 to 2	1

Category address: [Function] - [Function setting] - [Option] - [slotn] - [OP-05]

OP-05: Option Parallel input / output

slot n : slot number

Category address symbol	Name	Descriptions	Range and choices	Default
05 f- 1	Input terminal A1	Set the number of the function.  <b>Caution</b> <b>Avoid selecting the same function for multiple terminals and keys.</b>	0 to 50	0
05 f- 2	Input terminal A2		0 to 50	0
05 f- 3	Input terminal A3		0 to 50	0
05 f- 4	Input terminal A4		0 to 50	0
05 f- 5	Input terminal A5		0 to 50	0
05 f- 6	Input terminal A6		0 to 50	0
05 f- 7	Input terminal A7		0 to 50	0
05 f- 8	Input terminal A8		0 to 50	0
05 f- 9	Input terminal A9		0 to 50	0
05 f-10	Input terminal A10		0 to 50	0
05 f-11	Input terminal A11		0 to 50	0
05 f-12	Input terminal A12		0 to 50	0
05 f-13	Input terminal A13		0 to 50	0
05 f-14	Input terminal A14		0 to 50	0
05 f-15	Input terminal A15		0 to 50	0
05 f-16	Input terminal A16		0 to 50	0

Category address symbol	Name	Descriptions	Range and choices	Default
05 f-17	Input terminal B1	Material hopper 1 Medium flow	0 to 84	56
05 f-18	Input terminal B2	Material hopper 1 Dribble flow	0 to 84	57
05 f-19	Input terminal B3	Material hopper 2 Medium flow	0 to 84	59
05 f-20	Input terminal B4	Material hopper 2 Dribble flow	0 to 84	60
05 f-21	Input terminal B5	Material hopper 3 Medium flow	0 to 84	62
05 f-22	Input terminal B6	Material hopper 3 Dribble flow	0 to 84	63
05 f-23	Input terminal B7	Material hopper 4 Medium flow	0 to 84	65
05 f-24	Input terminal B8	Material hopper 4 Dribble flow	0 to 84	66
05 f-25	Input terminal B9	Material hopper 5 Medium flow	0 to 84	68
05 f-26	Input terminal B10	Material hopper 5 Dribble flow	0 to 50	69
05 f-27	Input terminal B11	Material hopper 6 Medium flow	0 to 50	71
05 f-28	Input terminal B12	Material hopper 6 Dribble flow	0 to 50	72
05 f-29	Input terminal B13	Material hopper 7 Medium flow	0 to 50	74
05 f-30	Input terminal B14	Material hopper 7 Dribble flow	0 to 50	75
05 f-31	Input terminal B15	Material hopper 8 Medium flow	0 to 50	77
05 f-32	Input terminal B16	Material hopper 8 Dribble flow	0 to 50	78

Category address: [Function] - [Function setting] - [Option] - [slotn] - [OP-07]

OP-07: Option Analog Output

slot n : slot number

Category address symbol	Name	Descriptions	Range and choices	Default
07 f- 1	Out put data	1: Displayed value 2: Gross value 3: Net value	1 to 3	1
07 f- 2	Weight at 4 mA	Set the weight value when 4 mA is output.	-999999 to 9999999	0
07 f- 3	Weight at 20 mA	Set the weight value when 20 mA is output.	-999999 to 9999999	16000



# 11. Specifications

## General

Power supply	85 to 250 VAC, 50 or 60Hz, (Stable power source)
Power consumption	Approximately 30 VA
Physical dimensions	192 (W) x 96 (H) x 135 (D) mm
Weight	Approximately 1.8 kg
Panel cutout size	186 x 92 mm
Operation temperature	-5 °C to 40 °C
Battery life of backup RAM	typ. 10 years at 25 °C. 5 years at 40 °C.

## Analog to Digital Unit

Input sensitivity	Up to 0.3 $\mu$ V / digit
Zero adjustment range	0 to 2 mV /V (0 to 20 mV)
Measurement range	0 to 3.2 mV /V (0 to 32 mV)
Input impedance	10 M $\Omega$
Loadcell excitation voltage	10 V DC $\pm$ 5%
Maximum loadcells	8 pieces in parallel with 350 $\Omega$ loadcell
Span temperature coefficient	8 ppm/ °C
Zero temperature coefficient	0.2 $\mu$ V + 8 ppm/ °C of dead load typ.
Non-linearity	0.01 % of F. S.
Input noise	Below $\pm$ 0.3 $\mu$ Vp-p
A/D conversion	$\Delta$ - $\Sigma$ conversion
A/D resolution	Approximately 1/1,000,000
Maximum display	16000 (to be able cancel limitation)
Sampling rate	100 times per second
Digital span function	Loadcell offset, calibration using key operation to enter the sensitivity, resolution 1/1000
Re-calibration at A/D board replacement	Omissible (resolution 1/500)
Backup method	A/D data: EEPROM Calibration: Flash memory Function: Flash memory Material code data: Backup RAM or flash memory Recipe code data Backup RAM or flash memory

## Display

Main display	Fluorescent display, cobalt blue, height: 18mm, 7seg., 7 figures
Sub-display	Fluorescent display, cobalt blue, height: 5mm, 7seg., 54 figures and 5x7 dots, 54 figures
State indicator	Fluorescent display, cobalt blue, 8 $\Delta$ pieces, 10 symbols, 5x7 dots
Unit indicator	Fluorescent display, cobalt blue, height: 11mm, 5x7 dots, 2 figures
Symbols	Fluorescent display, cobalt blue, height: 11mm, 5x7 dots, 2 figures



## Weighing

Weighing mode

Built-in automatic program mode:  
Normal batch weighing, loss-in-weigh  
Customer program control mode:  
Normal batch weighing, loss-in-weigh

Elements of built-in automatic program mode

Compensation Sequence  
Initial flow sequence  
Discharge Sequence  
Recipe Sequence  
Automatic Selection of Supplying Hopper  
Nozzle Control Sequence (vacuum cleaner)  
Mixing Sequence  
Safety Check Function  
Pause and Emergency Stop  
Restart Sequence  
Automatic Free Fall Compensation  
Real Time Free Fall Compensation

## Code data

Max. number of material codes 100 codes

Elements of the material code Name, hopper No., Final value, free fall, preliminary, optional preliminary, over, under, total count, total weight, tare value, compensation open timer, compensation close timer

Max. number of recipe code 100 codes

Elements of the recipe code Name, material codes (max. 10, in mixing order), total count, total weight

## Connectors and interfaces

Power supply terminal, Loadcell terminal, Standard I/O terminal, Standard RS-485 interface, Current loop, keys and display

Standard I/O terminal  
Refer to "8.1. Control I/O Function".

Standard RS-485 interface  
Refer to "8.2. Built-in RS-485 Interface".

Current loop  
Refer to "8.3. Built-in Current Loop Output".

BCD Output of Option OP-01  
Refer to "8.4. BCD Output of Option, OP-01".

Relay Output of Option OP-02  
Refer to "8.5. Relay Output of Option OP-02".

RS-422/485 Interface of Option OP-03  
Refer to "8.6. RS-422/485 Interface of Option OP-03".

RS-232C Interface of Option OP-04  
Refer to "8.7. RS-232C Interface of Option OP-04".

Parallel I/O of Option OP-05  
Refer to "8.8. Parallel I/O of Option OP-05".

Analog Output of Option OP-07  
Refer to "8.9. Analog Output of Option OP-07".

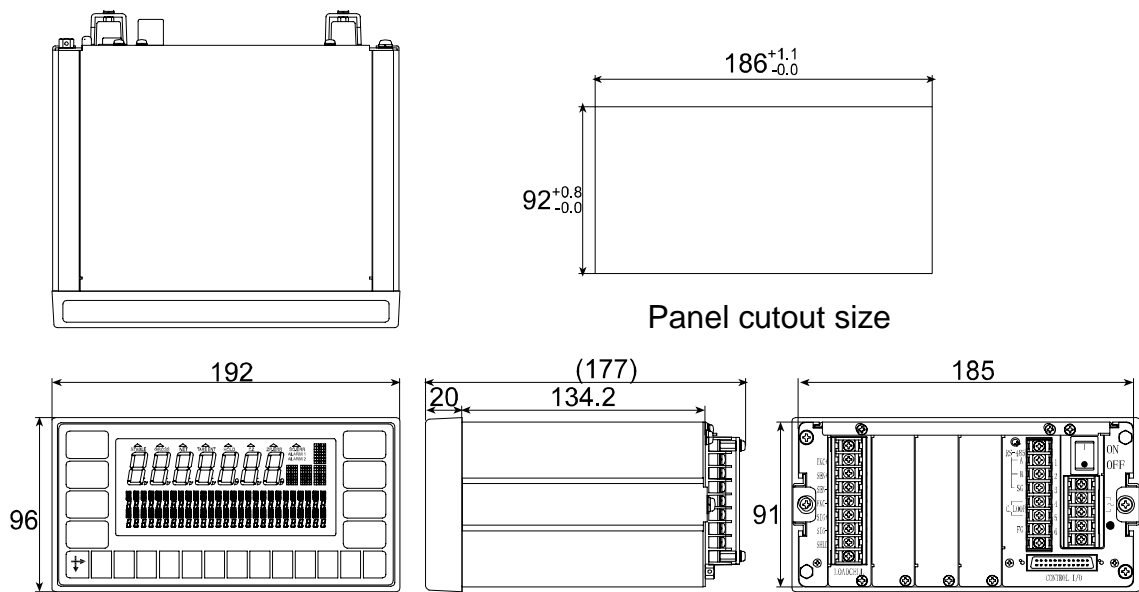
CC Link interface of Option OP-20  
Refer to OP-20 instruction manual regarding the details.

DeviceNet interface of Option OP-21  
Refer to OP-21 instruction manual regarding the details.

PROFIBUS interface of Option OP-22  
Refer to OP-22 instruction manual regarding the details.



## 11.1. Dimensions



## 11.2. Accessories

Capacity label .....	1
I/O connector .....	1
I/O connector cover .....	1
RS-485, terminator resistor 100 $\Omega$ .....	1
Cover of power supply terminal .....	1
Cover of RS-485 and current loop .....	1
Cover of loadcell terminal.....	1
Rubber packing for mounting to panel .....	1



## 12. References



### 12.1. Abbreviations

#	counts	OPPI m	Optional Preliminary
#Tot	total count	P I /O	parallel I/O
OBand	zero band	PI m	Preliminary
OT	tare is not used	PLC	programmable logic controller unit
ADC	Analog to digital converter	PT	preset tare
AFFC	active free fall compensation	RTot	recipe total
Brate	baud rate	RTot#	recipe total count
CZ	center of zero	SF	supplemental flow (compensation flow)
d	division	SFOT	Supplementary Flow Open Timer
DFI ow	dribble flow	SFCT	Supplementary Flow Close Timer
Eval	evaluation, (criteria)	T	tare
FFal l	free fall	TC	Tare clear
FFI ow	full flow	RTot	recipe total
FNC	function	RTot#	recipe total count
GS	gross	SF	supplemental flow (compensation flow)
Hop.	Hopper	SFOT	Supplementary Flow Open Timer
I /O	input / output	SFCT	Supplementary Flow Close Timer
I DF	initial dribble flow	T	tare
I FF	initial medium flow	TC	Tare clear
L	loadcell	Tot	Total Weight
LC	loadcell	Tot#	Total Count
MCode	material code	TR	tare
MFI ow	medium flow	w/	with
Neg	negative	w/O	with zero
NT	net	WGT	weight
NWT	net weight	WGTTot	weight total
Op.	optional	ZR	zero












## 12.2. ASCII Code for AD-4402

These characters are special code for the name of material code and recipe code. Therefore, some characters are not the same as U.S. code.

	Lower bits								
	0	1	2	3	4	5	6	7	
Upper bits	0			Space	0	@	P	Space	p
	1			!	1	A	Q	a	q
	2			"	2	B	R	b	r
	3			#	3	C	S	c	s
	4			\$	4	D	T	d	t
	5			%	5	E	U	e	u
	6			&	6	F	V	f	v
	7			'	7	G	W	g	w
	8			(	8	H	X	h	x
	9			)	9	I	Y	i	y
	A	LF		*	:	J	Z	j	z
	B			+	;	K	[	k	{
	C			,	<	L	¥	l	
	D	CR		-	=	M	]	m	}
	E			.	>	N	^	n	●
	F			/	?	O	_	o	○



## 12.3. Index

#	138	actual load calibration	20
#Tot	138	ADC	138
[Control I/O] - [Input]	122	AFFC	138
[Control I/O] - [Output]	124	alarm	71
[General] - [Others]	112	analog output	95, 133
[General] - [Sub-display]	110	ASCII code	139
[General] - [Weighing]	108	auto print mode	78, 84, 88
[OP-01]	128	backed up RAM	73
[OP-02]	129	batch weighing	25, 35
[OP-03]	130	baud rate	76, 84, 90, 93
[OP-04]	130	BCD output	85, 128
[OP-05]	132	BCD terminals	86
[OP-07]	133	Brate	138
[Sequence] - [Basic]	115	built-in automatic program mode	35, 39, 115
[Sequence] - [Control]	116	buzzer	113
[Sequence] - [Safety]	121	calibration	20
[Sequence] - [Setpoint]	120	capacity	13, 20
[Sequence] - [Timer]	118	category address	106
[Sequence] - [Total]	120	CERR1	24
[Serial] - [Current loop]	127	CERR10	24
[Serial] - [RS-485]	126	CERR11	24
 , CURSOR key	8	CERR2	24
 , CODE RECALL key	17	CERR3	24
 , ENTER key	8, 21, 22	CERR4	24
 , ESC key	8, 21, 22	CERR6	24
 , F1 key, F3 key	7, 113	CERR7	24
 , F2 key, F4 key	7, 113	CERR8	24
 , SHIFT key	7	CERR9	24
Standby indicator	9	Cl f	127
 , TARE key	8	clear	70
 , ZERO key	8	command mode	78
01 f	128	communication modes	78
02 f	129	comparison output	61
03 f	130	compensation	58, 59
04 f	130	compensation sequence	44
05 f	132	current loop	84
07 f	133	customer programmed control mode	35, 61, 62, 64, 115
OBand	138	CZ	9, 138
OT	138	d	138
1n f	123	D.FLOW	9
2 wires	76, 90	data length	76, 84, 90, 93
4 wires	90	decimal point	20
		delete	70
		DFI ow	138
		digital span	20
		discharge sequence	48
		division	20
		dribble flow	73
		earth terminal	6
		emergency	56
		emergency stop	56
		error code	24
		error message	71
		error signal	56
		Eval	138
		EXC-	12
		EXC+	12
		F.FLOW	9

FFal l	138	over	73
FFI ow	138	othf	112
FINISH	9	Outf	125
flash memory	73	output terminals	74
FNC	138	P I /O	138
forecast control function	39	Parallel I/O	132
free fall	58, 59	parameters	105
FULL	9	parity bit	76, 84, 90, 93
full flow	73	pause	56
fuse	6	PLC	138
G1	23	PI m	138
gate control	52	power consumption	134
genf	108	power cord	6
graphic display	69	power source	14, 134
graphic indicator	73	preset tare	67
gravity acceleration correction	20	PT	138
gross	67	real time free fall compensation	59
GS	138	recipe code	30, 135
Header	114	recipe mode	115
Hide elements	120	recipe sequence	50
Hop	52, 138	relay output	89, 129
hopper scale	25, 30, 34, 36	restart	57
I /O	138	re-zero	66
I/O terminals	94	r5 f	126
I DF	138	RS-232C	84, 93, 130
I MF	138	RS-422	90, 130
indication items	68	RS-485	76, 90, 130
initial flow sequence	46	RTot	138
input terminals	74	RTot #	138
intialization	102	safety check	56
IP-65	5	sampling rate	134
jet steam mode	78, 88	SEN-	12
key design	67	SEN+	12
L	138	sensitivity	13, 134
LC	138	setpoint	5, 38, 61, 62, 64
loadcell	12, 13	SF	138
loadcell excitation voltage	134	SFCT	138
loss-in-weigh	35, 36, 42, 115	SFOT	138
M.FLOW	9	span adjustment	20
manual print mode	78, 84, 88	5q f	115
mass	20	start bit	76, 84, 90, 93
material code	25, 135	stop bits	76, 84, 90, 93
maximum display	134	stream mode	78, 84, 88
MCode	138	sub-display	68
measuerment range	134	5Ubf	110
memory	73	summing box	20
menu	19	supplying hopper	36, 52
MFI ow	138	T	138
mixing sequence	54	tare	67
mode map	19	TC	138
monitor mode	96	terminal E	14
Neg	138	terminal parts	12, 14
net	67	terminator	76, 90
normal batch	115	test mode	99
normal batching	35, 36	Tot	138
nozzle	53	Tot #	138
NT	138	total	70
NWT	138	total print mode	78, 84, 88
OFF	16	TR	138
OK	73	under	73
ON	16	undo	70
Op.	138	unit	20
OPPI m	138	viscosity	59

w/.....	138
w/O.....	138
water-resistant panel.....	5
weighing status .....	73
weight.....	20
WGT.....	138
WGTTot .....	138

Z. BAND .....	9
zero point adjustment.....	20
zero range .....	134
zero tracking.....	66
ZR.....	138
ZR.ERR .....	9





