AD-4402

INSTRUCTION MANUAL

Multi Function Weighing Indicator

A&D

A&D Company, Limited

⚠ 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, Limited.

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

Contents

1. Compliance

1.1. Compliance with FCC Rules

❑ Please note that this equipment generates, uses and can radiate radio frequency energy. This equipment has been tested and has been found to comply with the limits of a Class A computing device pursuant to 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.)

1.2. 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 the 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 provide easy use of the indicator, even without the instruction manuals.

- Full weighing sequences
  The AD-4402 can mix multiple materials and is equipped with a recipe function.
  Equipped with a filling nozzle and agitation sequence.
  Using the forecast control function, flow control can be performed that is equivalent to an 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 250 VAC 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 a combination of material codes and weights.
  The material code is described as the weighing sequence parameters for 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
Earth ground the indicator by connecting the ground terminal ⏚ located on the rear panel to the earth, to prevent a fire, electrical shock or indicator malfunction.
Do not share the ground line with other electrical power equipment.

❑ Appropriate power cord
Use a power cord appropriate to the supply voltage and current used. Using an inappropriate cord may cause electrical leakage or a fire.
Connect the power cord to the terminals firmly using compression terminals.

❑ Fuse
A fuse is provided to protect against a fire hazard.
The indicator is equipped with various protection circuits and the fuse rarely burns out under normal operations.
If the fuse burns out, the internal circuits may have been damaged by surges. Do not try to replace the fuse. Contact the nearest A&D dealer.

❑ Splashing water
The indicator is not water-resistant.
Securing the indicator to the panel using the accessory rubber packing will provide the front panel the IP-65 protection.

❑ Flammable gas
Do not use the indicator in places where flammable gases are present.

❑ Heat radiation of the indicator
To prevent the indicator from overheating, allow appropriate clearance between the peripheral devices.
If the ambient temperature exceeds the specified operating temperature, use a fan to cool the environment.

❑ Removing the cover
Before removing the cover, be sure to remove the power cord from the power source to prevent an electric shock.
Do not touch the internal parts within ten seconds after removing the power cord to prevent an electric shock.

Graphic status indicator

Main display
Weighing data is displayed.

Status indicator

Sub-display
Materials, Total data, parameters and
operation guidance are displayed.

Unit indicator

Standby indicator
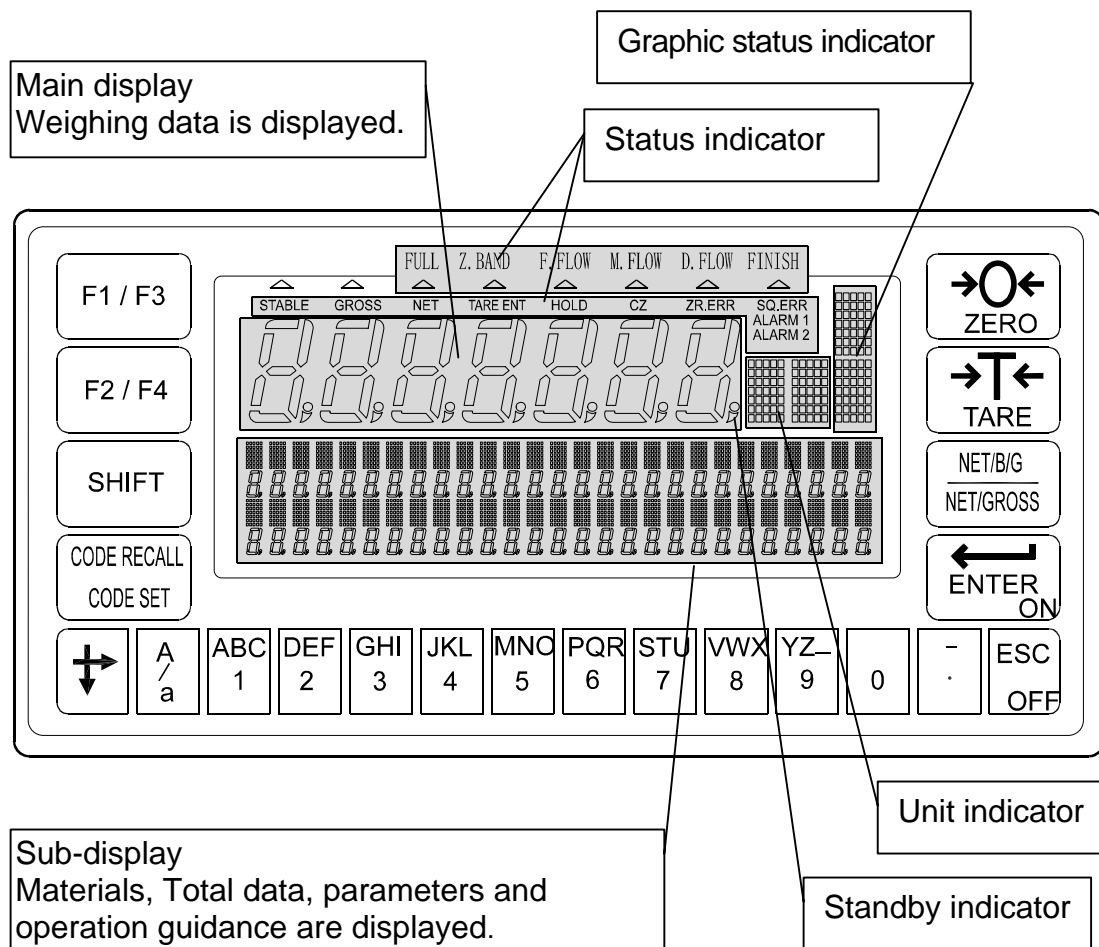
2.2.1.   Keys

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

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

| SHIFT | The key to select a function of a key. |

| CODE RECALL
CODE SET | 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. |

⊕ (cursor 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.
A/a	The key to select alphabetical keys, upper keys, lower keys or numerical keys.
ABC/1 to YZ/9 , 0 , −/.	**Alphanumerical** keys.
ESC OFF	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.
ENTER ON	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.
NET/B/G NET/GROSS	The key to select net or gross
→T← TARE	The tare key. The key is used to display the net value after that tare weight is subtracted from the gross weighing.
→O← ZERO	The zero key. To zero the current weighing display.
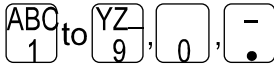
2.2.2.   Symbols

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 "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 overload or emergency stop mode.
ALARM 2	A fatal error sign. Example: The wire from the load cell 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

Load cell terminal.
Eight 350Ω load cells can be connected in parallel.

Built-in RS-485 terminal.
The possibility: to read weighing data, write parameters, connect 32 units of the indicator using with the multi-drop connection.

Main power switch

Power cord terminal

85 to 250 VAC (AD-4402)

19.2 to 28.8 VDC (AD-4402D)

EXC+
SEN+
SEN-
EXC-
SIG+
SIG-
SHLD

LOADCELL

RS-485
A
B
SG

C.LOOP

FG

ON
OFF

1
2
3
4
5
6

CONTROL I/O

Option slot to connect maximum three options. Example: BCD output, Relay output, Analog output and field bus.

Control I/O to connect to external control units.
11 input terminals,
11 output terminals,
An input common terminal
An output common terminal

Built-in current loop output
Use to connect A&D external monitor

⬇ 3. Installation

Caution
- **Remove the power cord before installing the indicator and options.**
- **Turn off peripheral devices before installing them.**
- **Insert the options before installing the indicator.**

⬇ 3.1. Mounting the Indicator

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

Panel

Rubber packing

Slide rail

M4 nylon washer

M4x15truss head screw

(156)

$186^{+1.1}_{-0.0}$

$92^{+0.8}_{-0.0}$
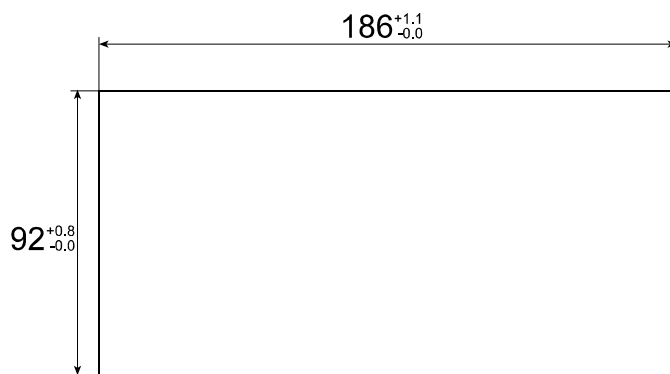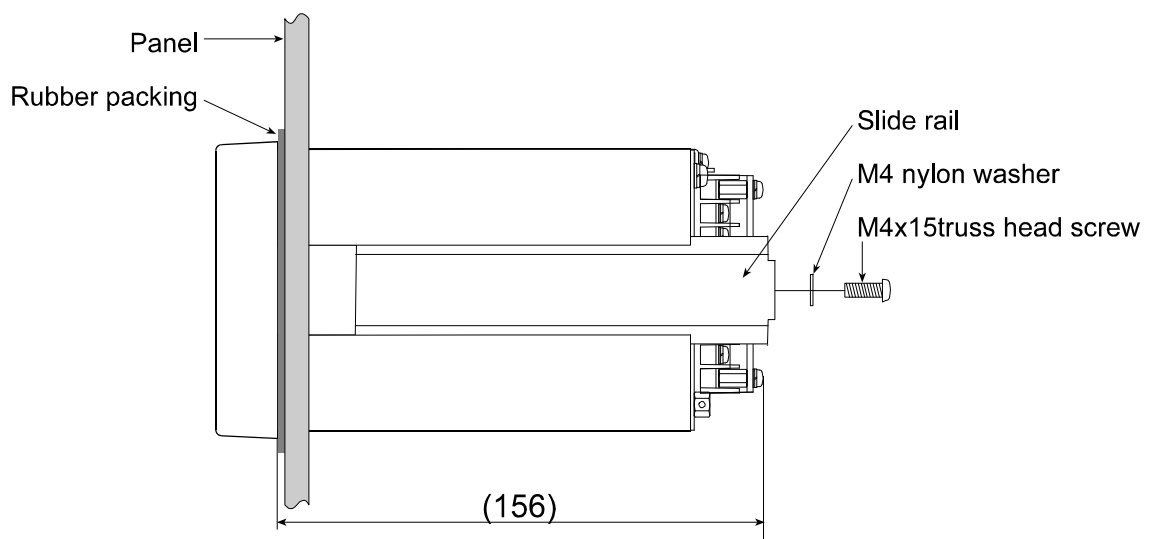
Panel Cutout size

⧫ 3.2. Connecting the Load cell Cable

Caution
- **Do not share the load cell cable with noise-generating devices or power lines, because the load cell signal is very sensitive.**

- We recommend that you use a 6 wire shielded cable to prevent loss of weighing precision.
- If the load cell 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).
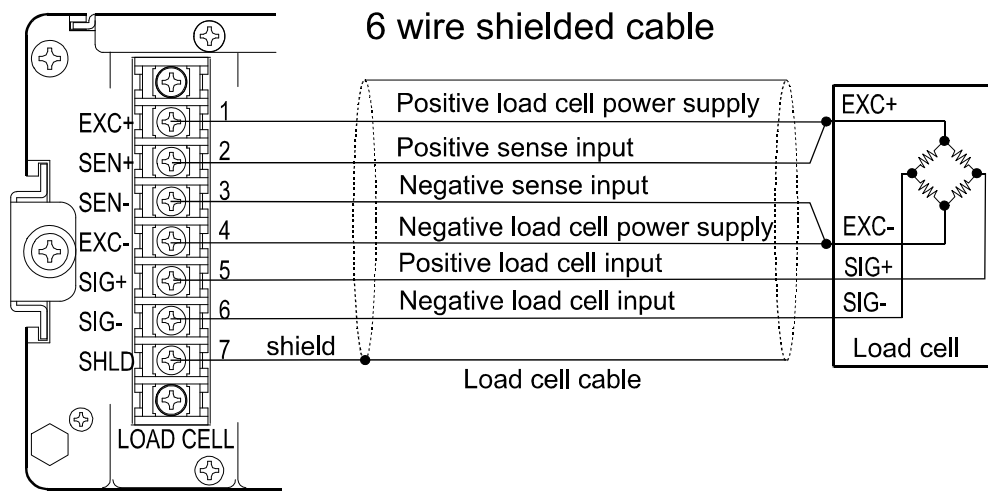
6 wire shielded cable

Terminal		Signal	Load cell
EXC+	1	Positive load cell power supply	EXC+
SEN+	2	Positive sense input	
SEN-	3	Negative sense input	
EXC-	4	Negative load cell power supply	EXC-
SIG+	5	Positive load cell input	SIG+
SIG-	6	Negative load cell input	SIG-
SHLD	7	shield	Load cell

Load cell cable

LOAD CELL

Adaptable Compression Terminal Parts
- Use the appropriate compression terminal parts to attach the cables.

6.2 3.2   6.2 3.2

Load cell 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 load cell output, to the indicator terminals.

In Case of Positive Offset

Positive load cell power supply — EXC+
Resistor
Negative load cell power supply — EXC-
Positive load cell input — SIG+
Negative load cell input — SIG-
Load cell
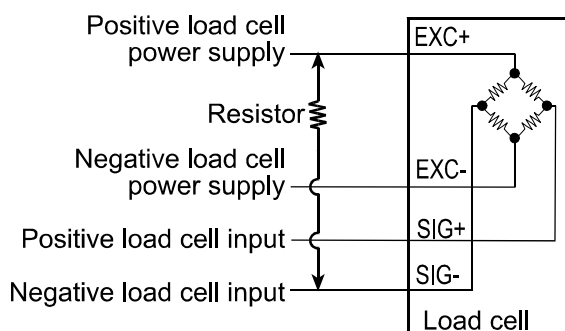
In Case of Negative Offset

Positive load cell power supply — EXC+
Resistor
Negative load cell power supply — EXC-
Positive load cell input — SIG+
Negative load cell input — SIG-
Load cell
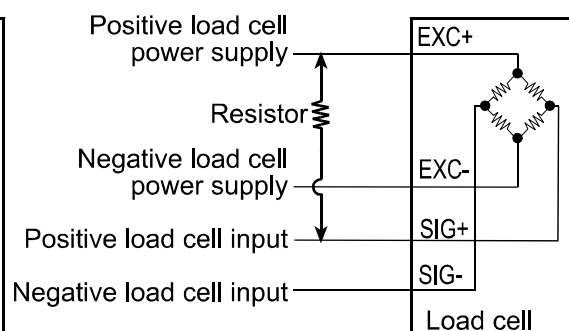
3.2.1. Verifying Load Cell Output and Input Sensitivity

The input sensitivity of the indicator is $0.3\mu V$/division or more. Adapt to the following inequality, when you design a weighing instrument using the indicator and load cell(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 load cell.	$0.3 \leq \dfrac{E*B*D}{A}$	A: Rated capacity of load cell [kg] B: Rated output [mV/V] D: Weighing interval [kg] E: Excitation voltage [mV] N: Number of load cells
Weighing instrument using multi-load cell	$0.3 \leq \dfrac{E*B*D}{A*N}$	

Verification Example

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

⬇ 3.3. Wiring Power Cord

Caution

- **Ground the indicator using the terminal E to avoid 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 errors.**

- The power source can be from 85 VAC to 250 VAC with 50 Hz or 60 Hz (AD-4402) or 24 VDC (AD-4402D).
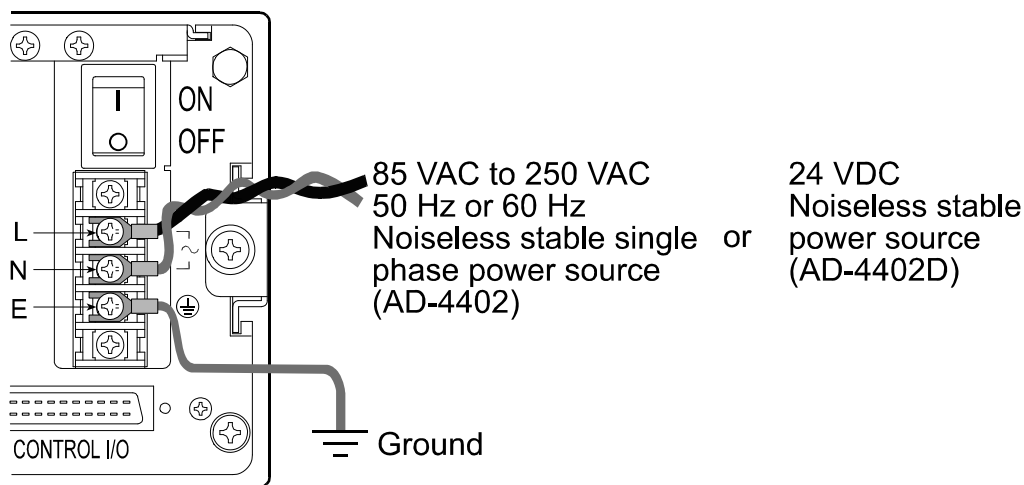
85 VAC to 250 VAC
50 Hz or 60 Hz
Noiseless stable single   or
phase power source
(AD-4402)

24 VDC
Noiseless stable
power source
(AD-4402D)

Ground

Adaptable Compression Terminal Parts

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

⬇ 3.4. Installing Options

Caution
- Remove the power cord before installing an option.
- Do not install the same options.
- Do not touch the internal parts within ten seconds after removing the power cord to prevent 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.

Step 7
Screw D

Option board

Option cover

Step 2

Connector

Step 5

Screw C

Screw C

Step 6

Board cross bar

Step 4

Upper cover

Step 3

Screw D

Screw A

Step 8

Step 9

Step 1   Screw B

Option cover
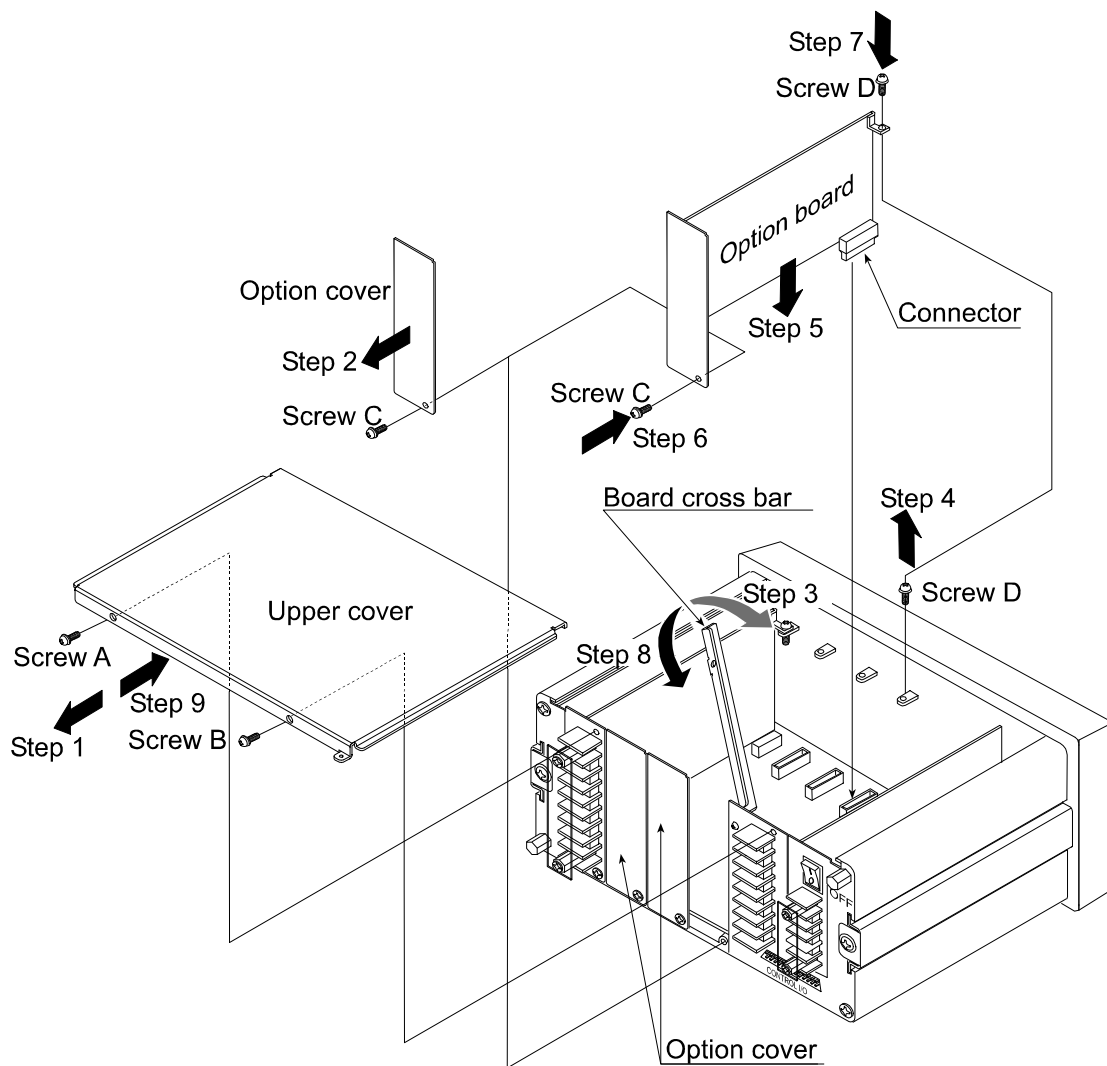
4. Basic Operation

4.1. Key Operation Examples

❏ This section describes the way of key operation.

4.1.1.   Standby Mode

OFF	Press and hold the **OFF** 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.
ON	The **ON** 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.

✛	The ✛ key is used to move the cursor forward.
SHIFT + ✛	Press and hold the **SHIFT** key and press the ✛ key to move the cursor backward.
ENTER	The **ENTER** key is used to enter the selected item.
ESC	The **ESC** 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.

A/a	The **A/a** key is used to change numerical key, upper keys, lower keys and alphabetical key.
Alphanumerical	The **alphanumerical** keys and the **ENTER** key are used to enter the parameters and to select a code number directly.
ENTER	The **ENTER** key is used to specify the alphanumerical data.
ESC	The **ESC** 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 [⁵⁹F⁻ 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:

✛	The ✛ key is used to increase the code number.
SHIFT + ✛	Press and hold the **SHIFT** key and press the ✛ key to decrease the code number.
Numerical	The **numerical** keys and the **ENTER** key are used to select a code number directly and to enter the parameters.
ENTER	The **ENTER** key is used to specify the number.
ESC	The **ESC** 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 [⁵⁹F⁻ 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 + ✛**, **Alphanumerical**, **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 the menu is displayed.

Step　2　Use the following keys in the menu :
　　　　　✛, **SHIFT**, **Alphanumerical**, **A/a** , **ENTER**, **ESC** keys

Step　3　Press the **ESC** key several times to return to the weighing mode.

AD–4402

```
START
Connecting power cord                    Removing and re-connecting
                                         power cord
                      Standby mode

              [ENTER ON]    [ESC OFF] Above 3sec.

                                              [ESC OFF] Several times
              Weighing mode
```

In case of *59 F-08 =0*
"Not used recipe mode"

[CODE RECALL / CODE SET] → Calling a Material Code

[SHIFT] [CODE RECALL / CODE SET] → Correction mode of a Material Code
Editing setpoints of a material code

In case of *59 F-08 = 1 or 2*
"Use recipe mode"

[CODE RECALL / CODE SET] → Calling a Recipe Code

[ENTER ON] [CODE RECALL / CODE SET] → Correction mode of a Recipe Code
Selecting a suit of material codes

[ENTER ON] [⏬]

Outline of Menu

```
├─ MatEDIT ──────────────── Edit
│  Material Edit              Search
│                            Delete ──────────── Total, Setpoints and Total, All Totals,
│                            Copy                 All Material Codes
│                            Tare
│
├─ RecipeEDIT ───────────── Edit
│                            Search
│                            Delete ──────────── Total, Recipe and Total, All Totals,
│                            Copy                 All Recipe Codes
│                            Tare
│
├─ CAL ───────────────────── CAL ──────────────── Actual Load Calibration (using Mass) or
│  Calibration                                     Digital Span (Calibration without Mass)
│                            Gravity Acceleration Correction
│
├─ Function ─────────────── Reference Mode ──── General, Sequence, Control I/O,
│  Parameters List                                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 [⏬] , [ENTER ON] , [ESC OFF] principally.
```

⬇ 5. Calibration

- The indicator, when connected to a load cell unit, can weigh the "weight" value on the load cell 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 load cell. 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 non-volatile memory in the indicator and are maintained even if power is removed.

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 of the weighing display.

Items for the "Actual Load Calibration"

Common items	Unit, decimal point, minimum division and weighing capacity
Zero point adjustment	The zero point output from the load cell unit is used.
Span adjustment	Rated mass is place 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	Numerical data is input as the zero point output of the load cell unit.
Rated capacity	The rated capacity of the load cell is input.
Sensitivity	The sensitivity of the load cell is input.

Caution

- **When the CAL switch on the A/D board is set to "DISABLE", calibration cannot be performed.**
- **Do not perform any calibration during a weighing sequence operation.**
- **Entering calibration mode during a weighing sequence operation will terminalte the weighing sequence operation. 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 "load cell summing box", when "digital span" is performed.**
- **It is necessary that the load cell sensitivity is exactly known if "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 the value after the **STABLE** indicator is displayed.
Whether the **STABLE** indicator is displayed or not, if you want to store the value, wait for ten seconds and press the **ENTER** key.

Step 9 If the **F1** key is pressed, the indicator 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 mass, specifyed in step 10, on the weighing pan and press the **ENTER** key to store the value after the **STABLE** indicator is displayed.
Whether the **STABLE** indicator is displayed or not, if you want to store the value, 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 proceed to the next step.

Step 10 Input the rated capacity of the load cell using the numerical keys and press the **ENTER** key to store the value.

Step 11 Input the sensitivity of the load cell in the unit of mV/V using the numerical keys and press the **ENTER** key to store the value.

Step 12 Press the **ESC** key to return the weighing mode.

Advice   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/s²	Manila	9.784 m/s²
Athens	9.800 m/s²	Melbourne	9.800 m/s²
Auckland NZ	9.799 m/s²	Mexico City	9.779 m/s²
Bangkok	9.783 m/s²	Milan	9.806 m/s²
Birmingham	9.813 m/s²	New York	9.802 m/s²
Brussels	9.811 m/s²	Oslo	9.819 m/s²
Buenos Aires	9.797 m/s²	Ottawa	9.806 m/s²
Calcutta	9.788 m/s²	Paris	9.809 m/s²
Chicago	9.803 m/s²	Rio de Janeiro	9.788 m/s²
Copenhagen	9.815 m/s²	Rome	9.803 m/s²
Cyprus	9.797 m/s²	San Francisco	9.800 m/s²
Djakarta	9.781 m/s²	Singapore	9.781 m/s²
Frankfurt	9.810 m/s²	Stockholm	9.818 m/s²
Glasgow	9.816 m/s²	Sydney	9.797 m/s²
Havana	9.788 m/s²	Tainan	9.788 m/s²
Helsinki	9.819 m/s²	Taipei	9.790 m/s²
Kuwait	9.793 m/s²	Tokyo	9.798 m/s²
Lisbon	9.801 m/s²	Vancouver, BC	9.809 m/s²
London (Greenwich)	9.812 m/s²	Washington DC	9.801 m/s²
Los Angeles	9.796 m/s²	Wellington NZ	9.803 m/s²
Madrid	9.800 m/s²	Zurich	9.807 m/s²

Graph: GRAVITY ACCELERATION [m/s²] vs LATITUDE, with ALTITUDE curves (Sea Level, 300m, 600m, 900m, 1200m, 1500m, 1800m, 2100m). Y-axis from 9.770 to 9.835, X-axis from 0° to 90°.
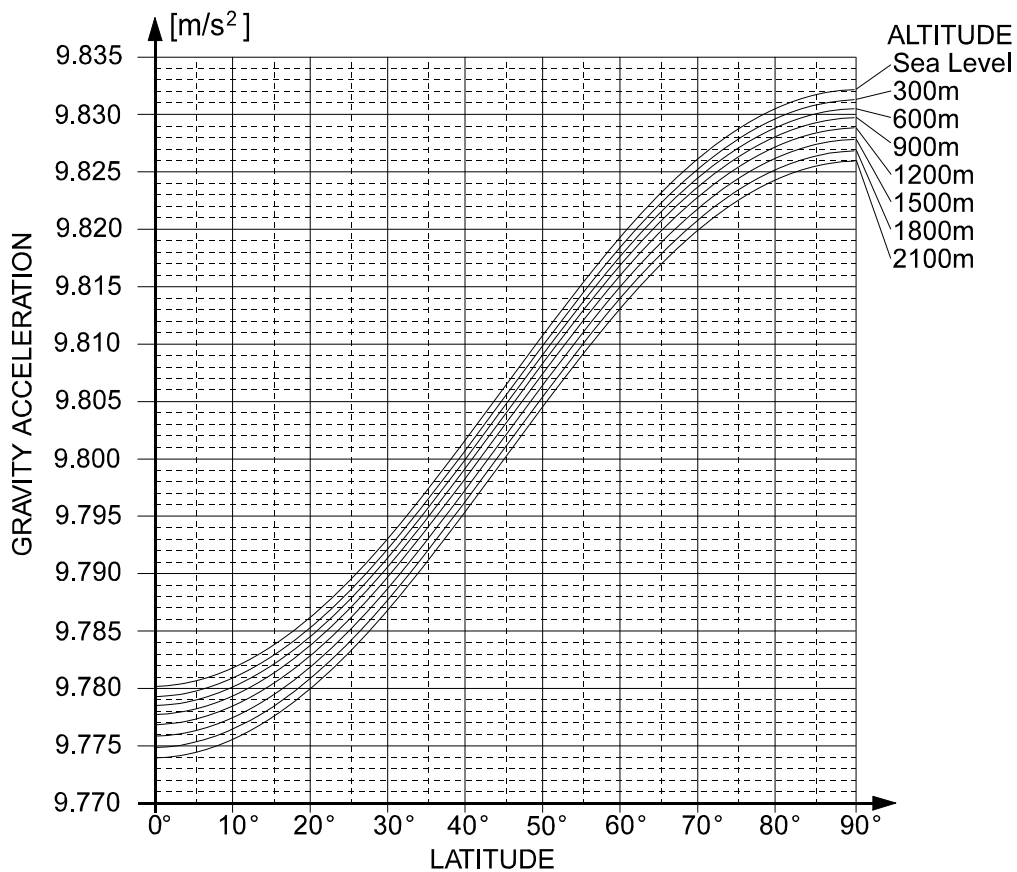
▼ 5.4. Calibration Error

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 load cell cable.
CERR3	Negative load cell output value. Check the load cell 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 load cell output to be equivalent to the minimum division is too small. Use a more rough minimum division.
CERR7	The polarity of the load cell output is reversed. Check the load cell 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/s².
CERR10	Zero output of the load cell unit is out of range. Trim the zero output within 0.0 ~ 2.0 mV/V.
CERR11	The load cell 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 this section, applications are explained based on to the hopper scale illustrated at the right, which 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.
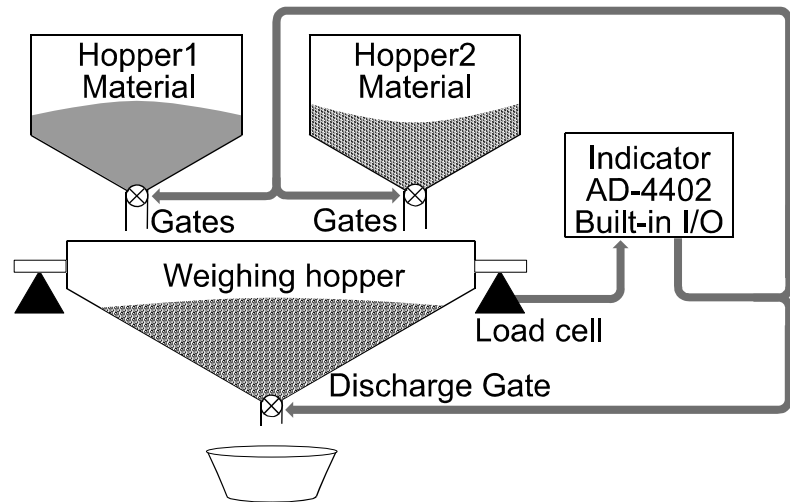
Example: Basic Hopper Scale

6.1.1. Definition of a Material Code

- The material code is necessary to store the details before use.
  And the code is recalled with a code number in a weighing.
- The material code is used in a procedure that performs batch weighing or loss-in-weigh. As the result of the procedure, a constant weight of the material can be obtained.
- The material code consists of an index number (name) and some setpoints (comparison values) to obtain a constant weight of the material.
- The AD-4402 can store one hundred 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 [59 $F-$ 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 use the code selected.

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 weighing is stopped while editing the parameters.

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 use the code selected.

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 the 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	0Band	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 [OtHF-11] of the function list.

Caution

If the flash memory is selected for memory backup [OtHF-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** key.

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

Step 6 Edit other parameters using the **numerical** keys, **ENTER** key and ✚ key.

Step 7 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 to the 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 3 Specify the code number to copy using the **numerical** keys and press the **ENTER** key.

Step 4 Specify the code number to copy data into using the **numerical** keys and press the **ENTER** key.

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

AD-4402

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

Then the current tare value is copied to preset tare.

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

This section explains 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 weight of an 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.
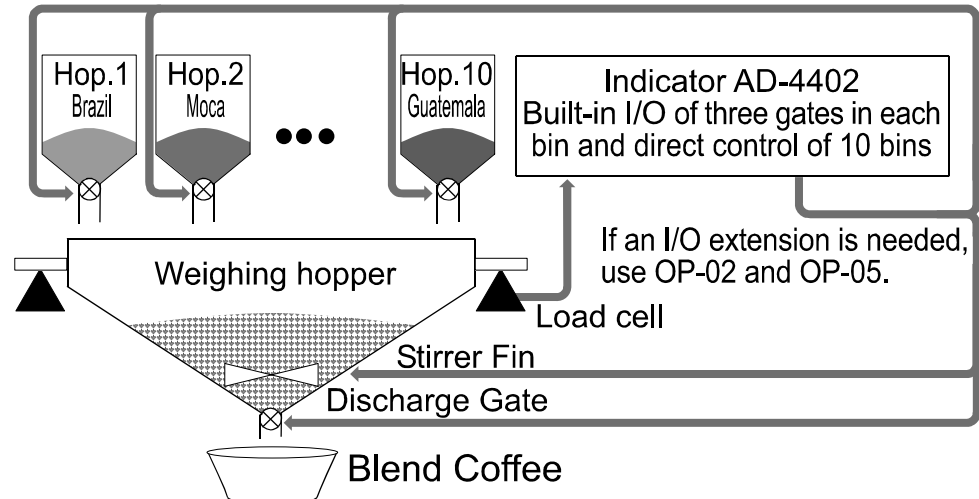
Example: Simple Hopper Scale
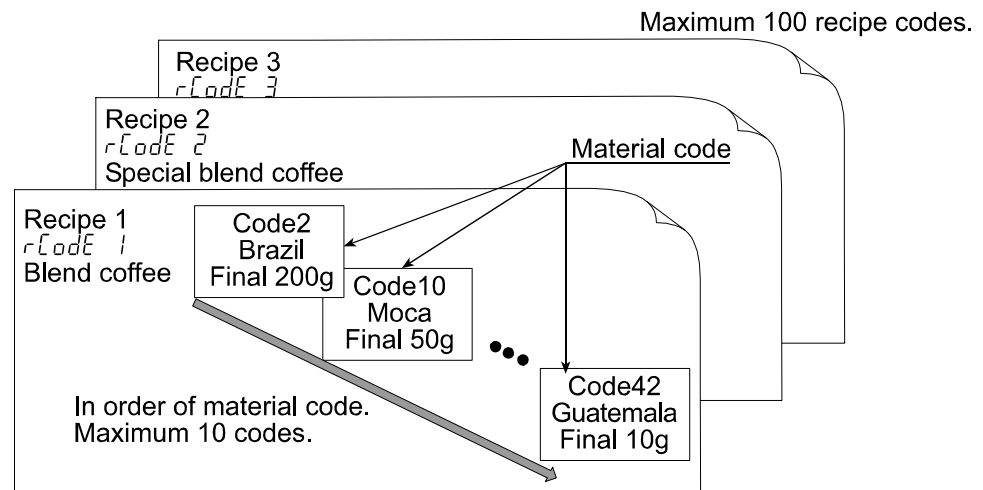
6.2.1. Definition of a Recipe Code

❑ 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 recalled 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 obtain 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 ([*5⁹ F- 8*] to [*I*] or [*2*]), when the recipe code is used.
[*5⁹ F- 8*] [*I*]　Semi-automatic mixing sequence
[*5⁹ 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 [*0ヒHF- I I*] of the function list.

Caution
If the flash memory is selected for memory backup [*0ヒHF- I I*], 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	*Blend coffee*	
Material codes of maximum ten codes. It is stored in order to accumulate them.	*CodE I*	
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 [*5⁹ F- 8*] [*I*] 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 use the code selected.

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 **alpanumerical** 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 a 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 to the next step.
Then the results are displayed.

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

Delete of a 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 several times to return to the 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 3 Specify the code number to copy using the **numerical** keys and press the **ENTER** key.

Step 4 Specify the code number to copy data into using the **numerical** keys and press the **ENTER** key.

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

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 AD-4402 indicator has an I/O interface to control the system, a sub-display to monitor system information, a 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,	[OthF- 2] [6]
Emergency stop key:	F2 key,	[OthF- 3] [13]
Dribble signal :	terminal B1,	[OutF- 1] [6]
Batch finish signal :	terminal B2,	[OutF- 2] [14]
Not used recipe code		[Sq F- 8] [0]
Use default setting for the sub-display		[Sub 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 5 Select the menu terminal B1.

   ([Function] - [Function setting] - [Control I/O Function] - [Output] - [OUT (B1)])

Step 6 Select [6] of Dribble flow for the terminal B1 and store it.

Step 7 Select [14] of Batch finish for the terminal B2 and store it.

Step 8 Set [6] of "Not used recipe code" at Recipe mode.

   ([Function] - [Function setting] - [Sequence] - [Basic] - [Recipe mode])

Step 9 Select [0] of the default menu and store it.

   ([Function] - [Function setting] - [General] - [Sub-display] - [Weighing display])

Step 10 Press the **ESC** key several times to return to the weighing 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. Contents of the Batch Weighing Mode

Batch Weighing

Controlled Output Signals

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

Partial Sequence of the Built-in Automatic Program Mode

⬇ 7.2. Batch Weighing Mode

- ❑ This mode is used to obtain 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.

Supplying hopper

Function
[59F-3] [0]
Normal Batching

Gates

Full flow
Medium flow
Dribble flow

Indicator
Final weight 10kg

Weighing Hopper

Load cell

10kg

Discharge Gate
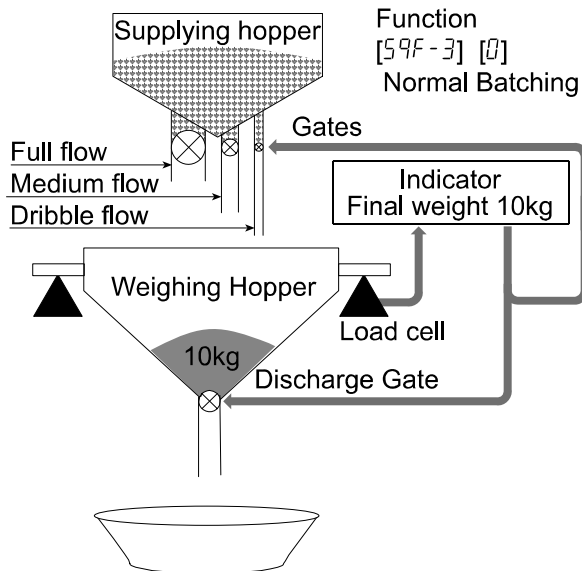
Example: Normal Batching

Supplying hopper

Function
[59F-3] [1]
Loss-in-Weigh

Supply Gate

Indicator
Final weight 10kg

Weighing Hopper

Load cell

Discharge Gates

Full flow
Medium flow
Dribble flow

10kg
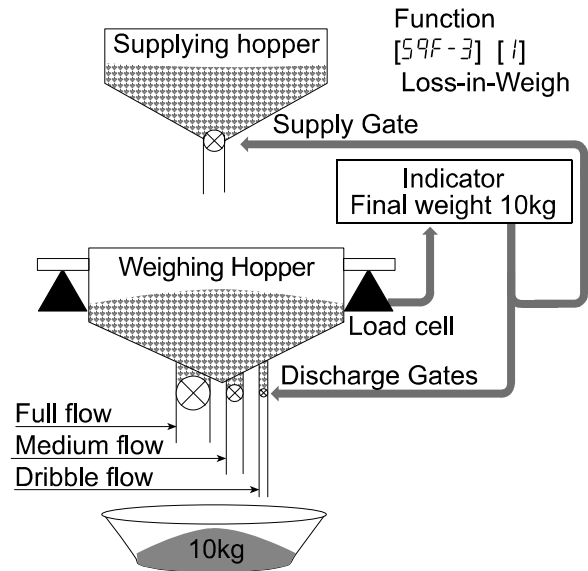
Example: Loss-in-Weigh

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 a 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])
  [59 F- 3] [0]   Normal batch weighing
  [59 F- 3] [1]   Loss-in-weigh
  [59 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.
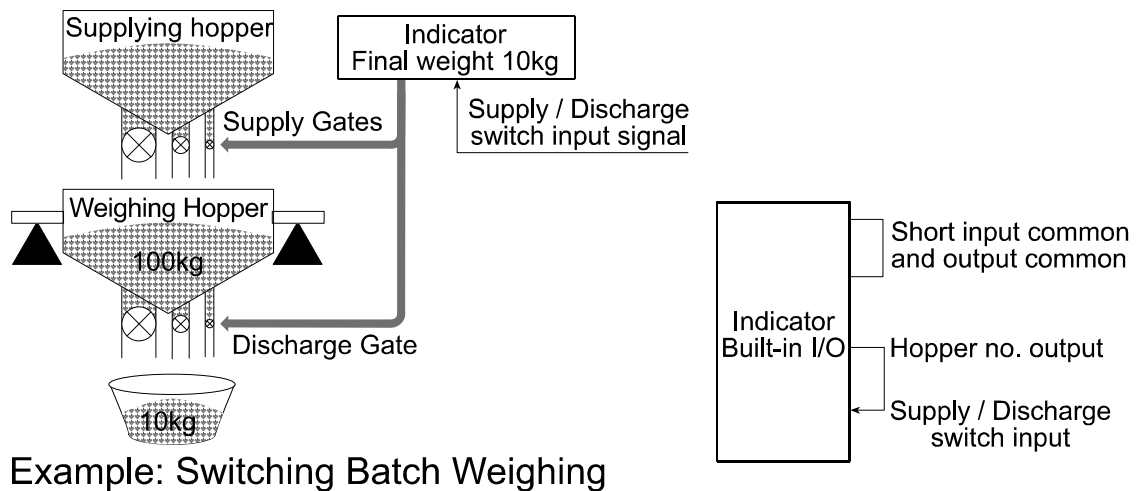
Example: Switching Batch Weighing

Advice

If the mode is switched concerning a specified material only, set the hopper number. in the material code, short the hopper number output line and the supply/discharge switch input line. Set the delay timer [59 F-32] to "above 0.1sec.".

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▼ 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 control I/O signal output power is too small to drive large valves 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 rate is equivalent to 1000 [times/second], when this function is used.

Caution
- **If multiple supplying hoppers are used (the recipe code is used), this mode cannot be used.**
  Related section " 7.3.7. Automatic Selection of the 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 the 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 the built-in automatic program mode.
  [59 F- 1] [2]   Built-in automatic program mode
  [Function] - [Function setting] - [Sequence] - [Basic] - [Weighing mode]
  [59 F- 3] [0]   Normal batch weighing
  [Function] - [Function setting] - [Sequence] - [Basic] - [Loss-in-weigh]

- ❑ Setting the display to automatically when starting the sequence.
  [59 F- 11]   [Function] - [Function setting] - [Sequence] - [Control] - [Batch start settings]

- ❑ Preventing vibration due to gate operation.
  [59 F-33]   [Function] - [Function setting] - [Sequence] - [Timer] - [Full flow comparison interrupt timer]
  [59 F-34]   [Function] - [Function setting] - [Sequence] - [Timer] - [Medium flow comparison interrupt timer]
  [59 F-35]   [Function] - [Function setting] - [Sequence] - [Timer] - [Dribble flow comparison interrupt timer]

- ❑ Sending an alarm signal when the sequence time has been exceeded (over).
  [59 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.
  [59 F- 13]   [Function] - [Function setting] - [Sequence] - [Control] - [Eval condition]

- ❑ Changing the timing of comparison.
  [59 F-37]   [Function] - [Function setting] - [Sequence] - [Timer] - [Eval delay timer]

- ❑ Changing the accuracy of comparison.
  [59 F-48]   The time to average the 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.
  [59 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.
  [59 F- 14]   [Function] - [Function setting] - [Sequence] - [Control] - [Batch finish action]

- ❑ Discharging at batch finish.
  [59 F- 15]   [Function] - [Function setting] - [Sequence] - [Control] - [Discharge finish action]

□ Using customer programmed control for the OVER signal, OK signal and UNDER signal.
[59 F- 5]　　　　[Function] - [Function setting] - [Sequence] - [Basic] - [Comparison]

Displayed value

Preliminary

Final value (Target weight)

Gross weight

Net weight

Final value - Free fall

Free fall

Final value - Preliminary

Final value - Optional preliminary

Optional preliminary

Zero band

Tare

0

Material code, Input — The active code is only read at each start. And keep it. — 1 / 0

Start command, Input

59F-32
Batch start delay timer — Time until supplying it

59F-31
Batch monitoring timer — The whole time to supply it

Full flow, Output

Medium flow, Output

Dribble flow, Output

59F-33
Full flow comparison interrupt timer

59F-34
Medium flow comparison interrupt timer

59F-35
Dribble flow comparison interrupt timer — Comparison — According to 59F-37 and stable. 59F-13 can be set.

59F-37
Eval delay timer

Stable, Output

Batch finish, Output — 59F-43 Batch finish output on

Over, Output — Select a mode at 59F-05

OK, Output

Under, Output

Discharge start, Input

Discharge start delay timer — If discharge sequence, set the function.

Discharge monitoring timer

Discharge, Output

Nearly zero, Output

Discharge gate close timer

Discharge finish, Output

Drawing: Normal Batching of the Built-in automatic program mode

7.3.2. Loss-in-weigh of Built-in Automatic Program 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 the built-in automatic program mode.
  [59 F- 1] [1]   Built-in automatic program mode
  [Function] - [Function setting] - [Sequence] - [Basic] - [Weighing mode]
  [59 F- 3] [0]   Normal batch weighing
  [Function] - [Function setting] - [Sequence] - [Basic] - [Loss-in-weigh]

- Setting the display to zero automatically when starting the sequence.
  [59 F- 11]   [Function] - [Function setting] - [Sequence] - [Control] - [Batch start settings]

- Switching normal batching and loss-in-weigh from the I/O interface.
  [59 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 there is enough remaining weight for one batch weighing.
  [59 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]

  [59 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]

Displayed value

Full value

Gross weight

Full

Zero band

0

Net weight

Final value

- Final value + Optional preliminary

- Final value + Preliminary

- Final value + Free fall

Preliminary

Optional preliminary

- Final value
or -Target weight

Free fall

Enable automatic tare to use

The active code is only read at each start. And keep it.

Tare command, Input

Material code, Input

Start command, Input

59F-32
Start delay timer

Time until supplying it

59F-31
Batch monitoring timer

Monitor to supply it

Full flow, Output

Medium flow, Output

Dribble flow, Output

59F-33
Full flow comparison interrupt timer

59F-34
Medium flow comparison interrupt timer

59F-35
Dribble flow comparison interrupt timer

Comparison

59F-37
Eval delay timer

Stable, Output

Batch finish, Output

59F-43
batch finish output on

Select a mode at *59F-05*

Over, Output

OK, Output

Under, Output

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.

[59 F-18] If the 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.

[59 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 [59 F-12].
[Function] - [Function setting] - [Sequence] - [Control] - [Nozzle control]

Displayed value

Preliminary   Free fall   Under weight

Final value (Target weight)

Net weight

Optional preliminary

0

Material code, Input

Start command, Input

59F-32
Batch start delay timer

Time until supplying it

The whole time to supply it

59F-31
Batch monitoring timer

Full flow, Output

Medium flow, Output

Dribble flow, Output

59F-37
Eval delay timer

Set maximum counts of compensation at 59F-18

Supplementary flow open timer

Supplementary flow close timer

Comparison

Stable, Out

Batch finish, Output

Overt, Output

OK, Output

Under, Output

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.

Initial DF (Initial dribble flow)

Initial MF (Initial medium flow)

❑ Editing these parameters.

Edit the parameters in the function mode.

[Function] - [Function setting] - [MatEDIT] - [Edit]

❑ Inhibiting comparison during the sequence.

[59 F-35]   Store the time of the dribble flow comparison inhibit timer.

[Function] - [Function setting] - [Sequence] - [Timer] - [Dribble flow comparison interrupt timer]

[59 F-34]   Store the time of the medium flow comparison inhibit timer.

[Function] - [Function setting] - [Sequence] - [Timer] - [Medium flow comparison interrupt timer]
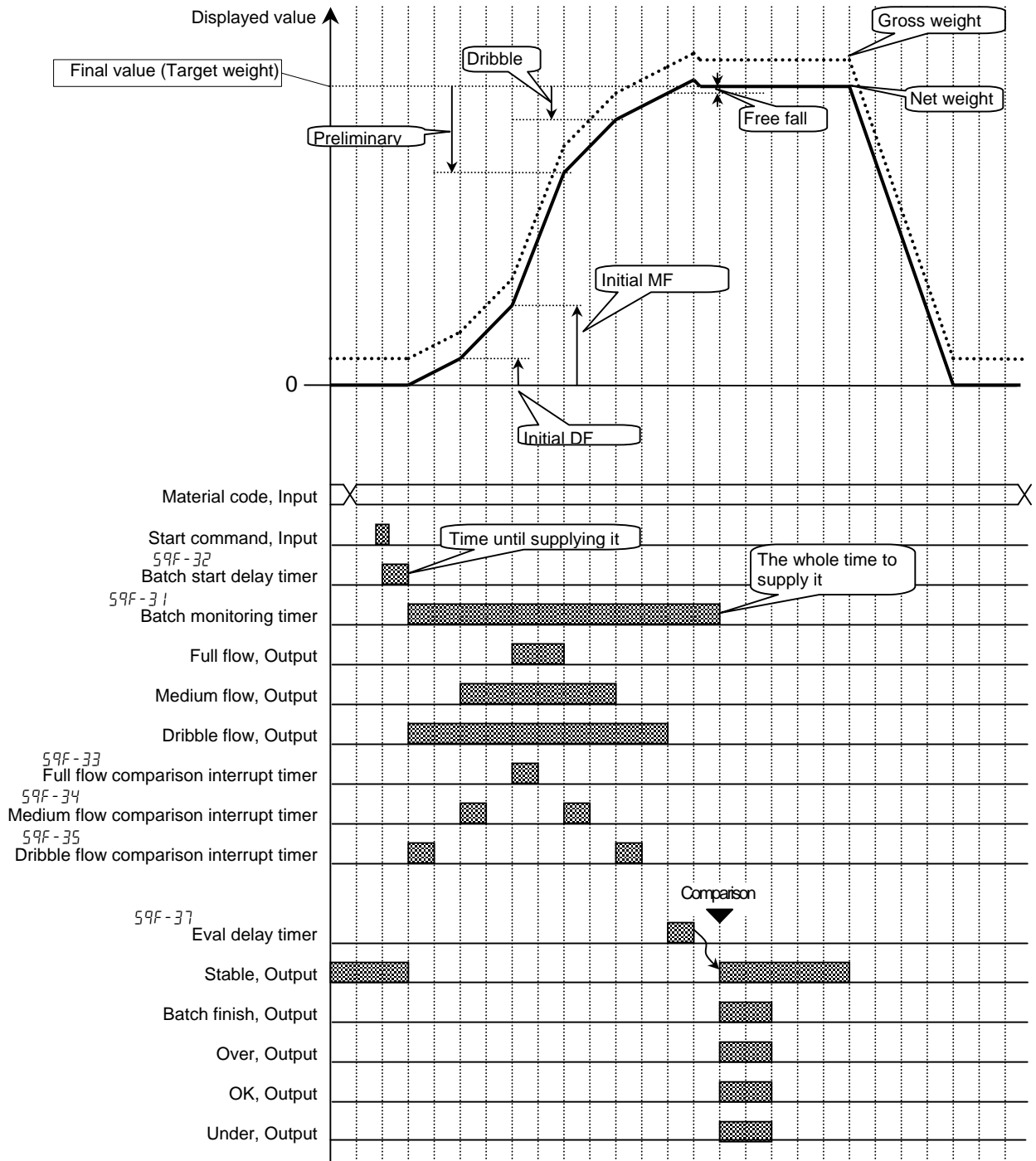
Drawing: Initial Flow Sequence

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.
[59 F-38]   [Function] - [Function setting] - [Sequence] - [Timer] - [Discharge start delay timer]

❑ Using the alarm for the discharge time limit.
[59 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.
[59 F-40]   [Function] - [Function setting] - [Sequence] - [Timer] - [Discharge gate close delay timer]

❑ Discharging it automatically when the weighing is finished.
[59 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.
[59 F-17]   When the finish signal is turned off, the discharge start timer starts.
[Function] - [Function setting] - [Sequence] - [Control] - [Recipe finish action]
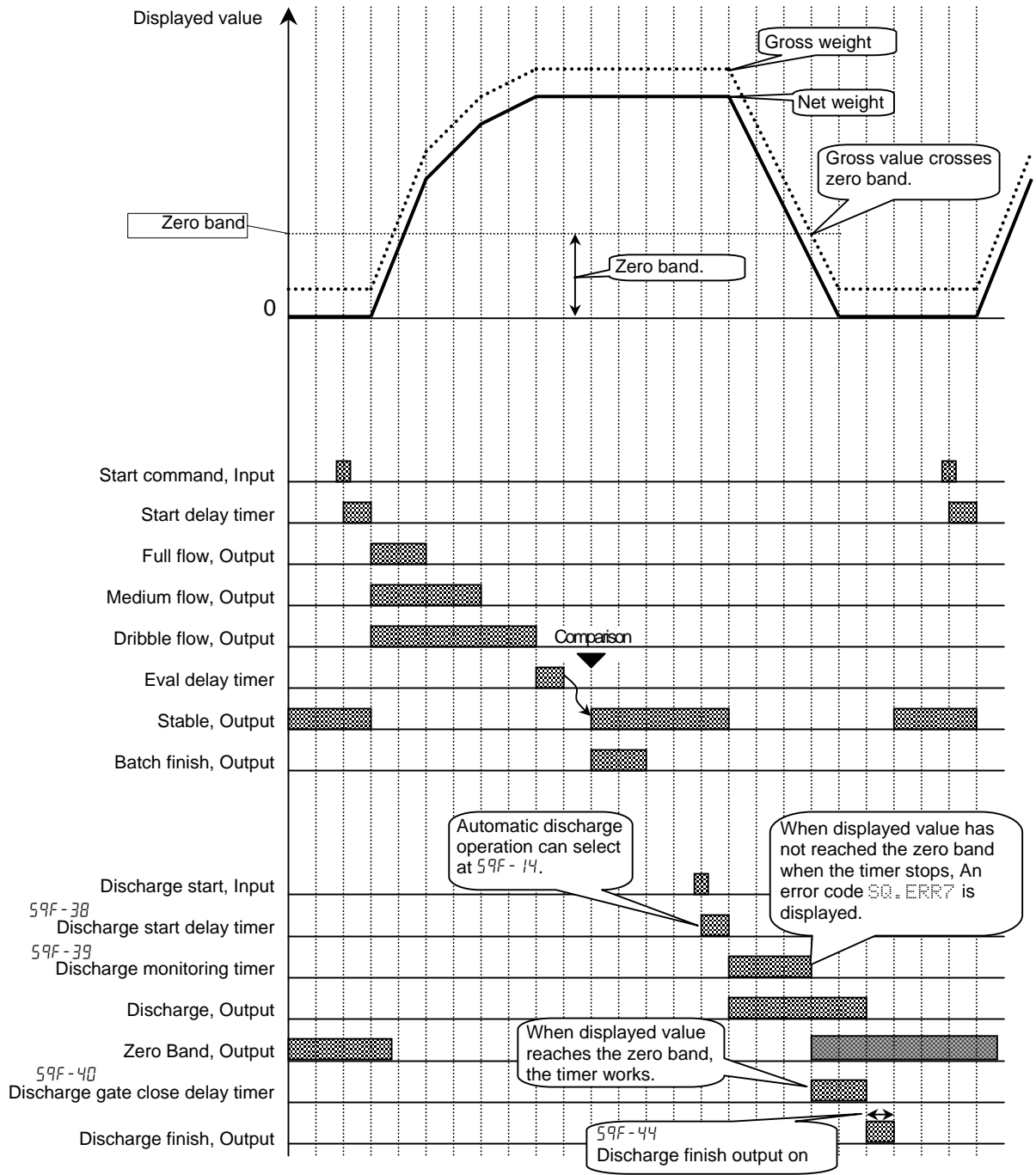
Drawing: Discharge Sequence

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   [59F- 8] [l]   The mode that uses (external) start commands for each material.
  Automatic   [59F- 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 the built-in automatic program mode.
  [59 F- 8]   Recipe mode
  [59 F- 8] [l]   Semi-automatic mode, or
  [59 F- 8] [2]   Automatic mode
                   [Function] - [Function setting] - [Sequence] - [Basic] - [Recipe mode]

- Setting the display to zero automatically when starting the recipe sequence.
  [59 F- 16]   [Function] - [Function setting] - [Sequence] - [Control] - [Recipe start action]

- Clearing tare values, mixing them and discharging them when finishing the recipe sequence.
  [59 F- 17]   [Function] - [Function setting] - [Sequence] - [Control] - [Recipe finish action]

- Changing the width of the finish signal output of the recipe sequence.
  [59 F-45]   [Function] - [Function setting] - [Sequence] - [Timer] - [Recipe finish output on]

- Calculating totals in each recipe code.
  [59 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 the recipe prohibition command of the external I/O or OP-05. When the prohibition is in operation, the material code can be used and the total of the recipe is not changed.

- Setting of the I/O.
  [In F-nn] [49]   Recipe interrupt (Prohibition of recipe sequence)
                    nn: terminal number of I/O.
                    [Function] - [Function setting] - [Control I/O] - [Input]
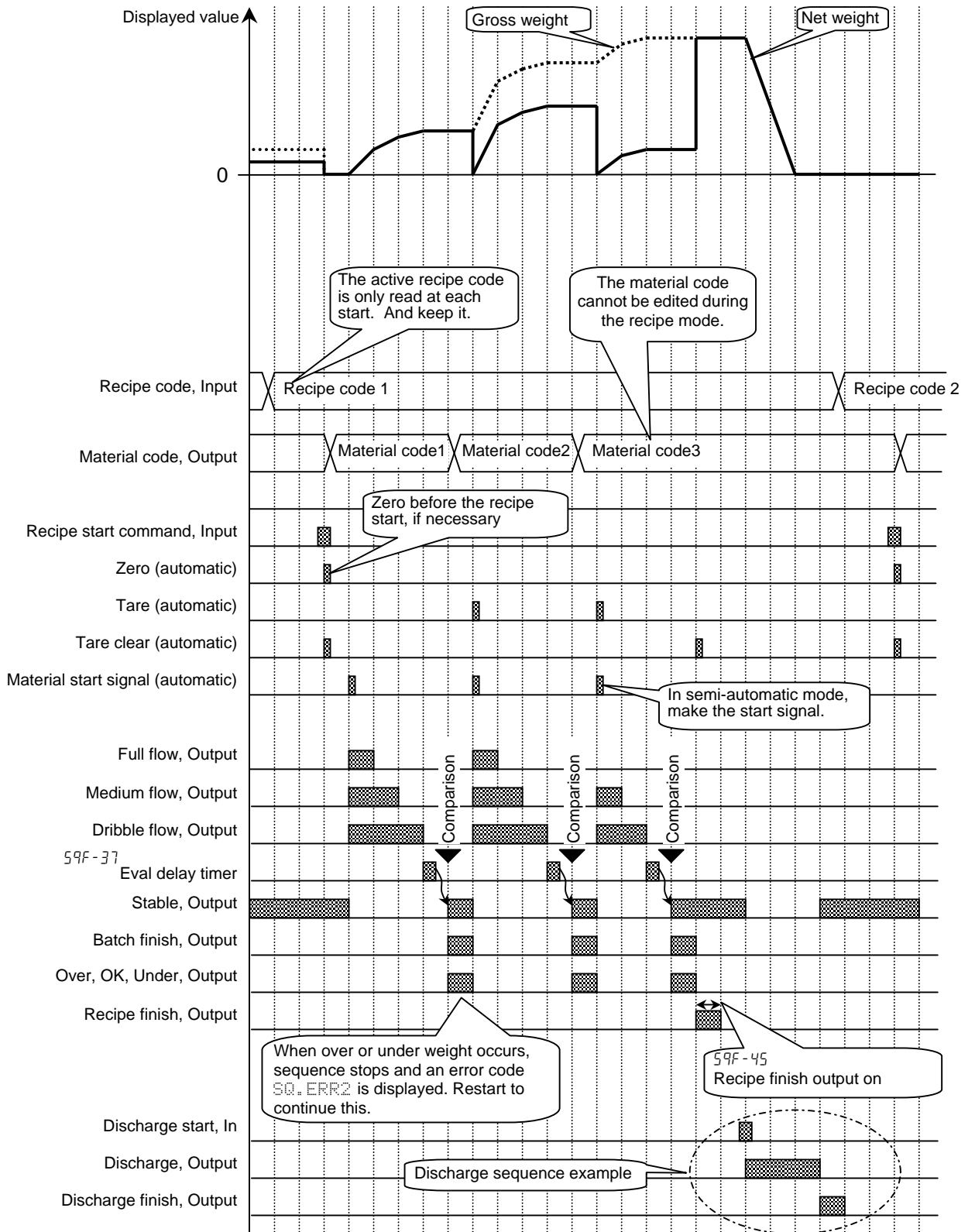
Drawing: Recipe Sequence

7.3.7.   Automatic Selection of the Supplying Hopper

- □ When multiple supplying hoppers are used, the indicator has to control the gates of the hoppers. There are two methods to control the gates.

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 hoppers: **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 the relay output option (OP-02) or parallel I/O (OP-05).

Gate lines

Hop.1 Brazil   Hop.2 Moca   •••   Hop.10 Guatemala

INDICATOR AD4402
Connect to three gates in each hopper and control 10 hoppers directly.

If an I/O extension is needed, use OP-02 and OP-05.
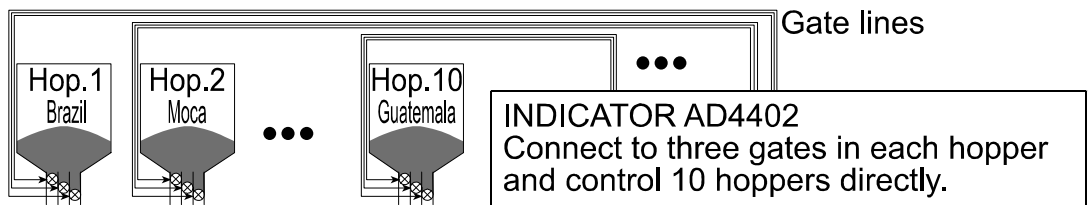
Example: Direct Gate Control

Case 2: Gate Control with Supplying Hopper Selection

The method:
- □ Parallel the **gate-lines** of hopper gates of a kind and connect them to the I/O terminals of the indicator.
- □ Make **hop-lines** that are identified by each hopper and connect them to the I/O terminals.
- □ 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 hoppers: **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 the number of I/O terminals is not enough, use the relay output options (OP-02) or parallel I/O (OP-05).

Gate-lines

Hop.1 Brazil   Hop.2 Moca   •••   Hop.20 Guatemala

INDICATOR AD4402
Connect to three gates in each 20 hoppers and control gates with logical AND gate based on gate-line and hop-line.

Hop-lines

If an I/O extension is needed, use OP-02 and OP-05.
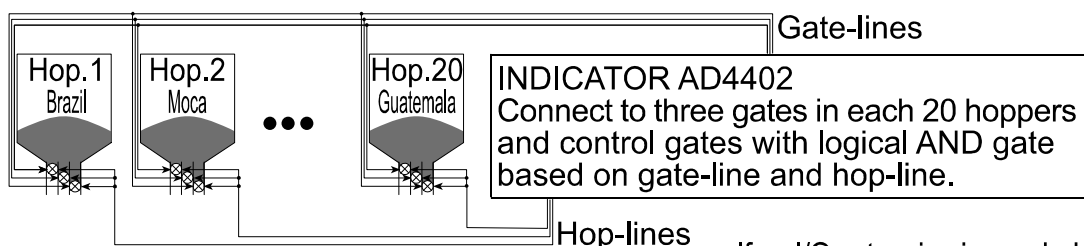
Example: AND Gate Control

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.

Advice

❑ In the case of using the nozzle control sequence
[*59 F-12*]   [Function] - [Function setting] - [Sequence] - [Control] - [Nozzle control]

❑ In the case of using the timer to ready the nozzle.
[*59 F-32*]   [Function] - [Function setting] - [Sequence] - [Timer - [Batch start delay timer]

❑ In the 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 the case of compare after shifting the nozzle up
[*59 F-12*]   [Function] - [Function setting] - [Sequence] - [Control] - [Nozzle control]

Example: Nozzle Operation
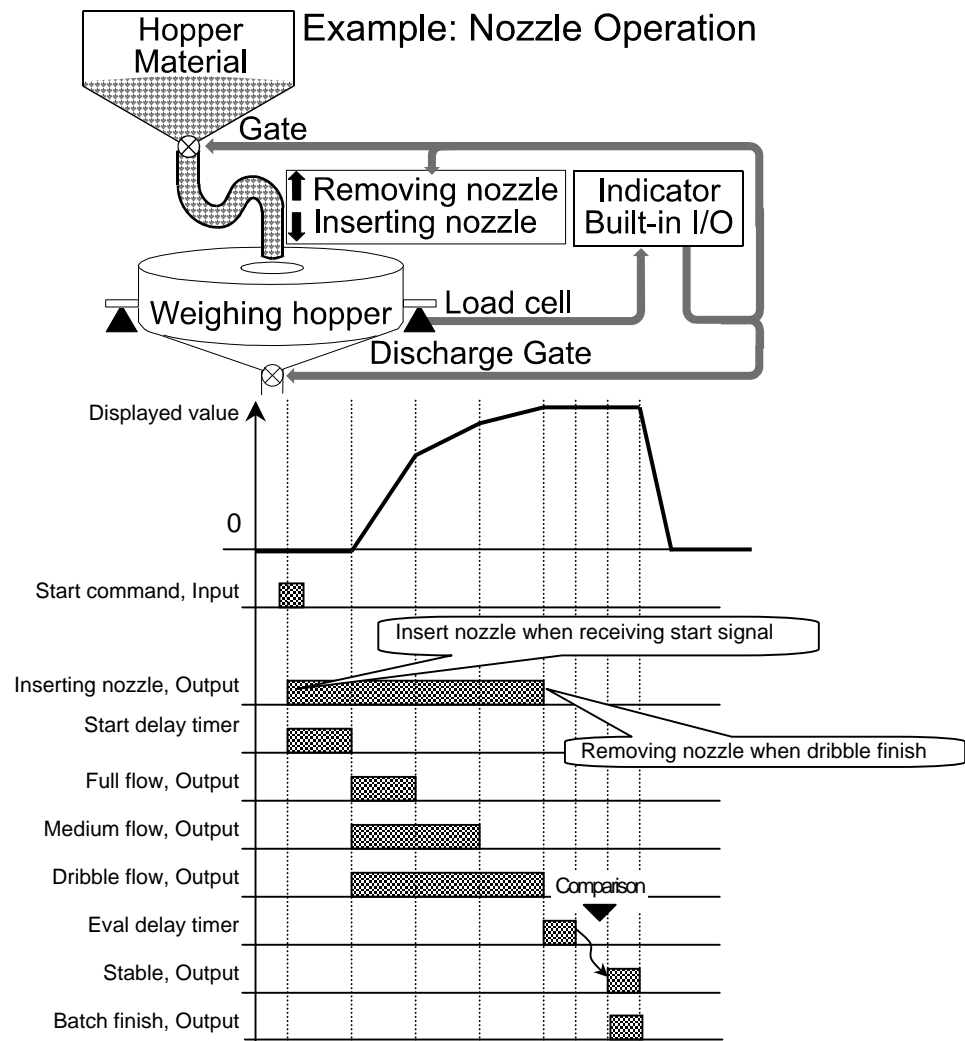
7.3.9.　Mixing Sequence

❑ 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]　Mixing

　　　　　　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

[Sq F-14]　　　[Function] - [Function setting] - [Sequence] - [Control] - [Batch finish action]

❑ Mixing material after discharge

[Sq F-15]　　　[Function] - [Function setting] - [Sequence] - [Control] - [Discharge finish action]

❑ Mixing material at recipe finish

[Sq F-17]　　　[Function] - [Function setting] - [Sequence] - [Control] - [Recipe finish action]

❑ Storing the time of mixing

[Sq F-47]　　　[Function] - [Function setting] - [Sequence] - [Timer] - [Mixing time output on]

❑ Safety check during mixing

[Sq F-74]　　　[Function] - [Function setting] - [Sequence] - [Safety] - [Mixing safety check]

Advice

❑ Safety check during mixing
When the specified input terminals at [Sq 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.

Example: Mixing Sequence
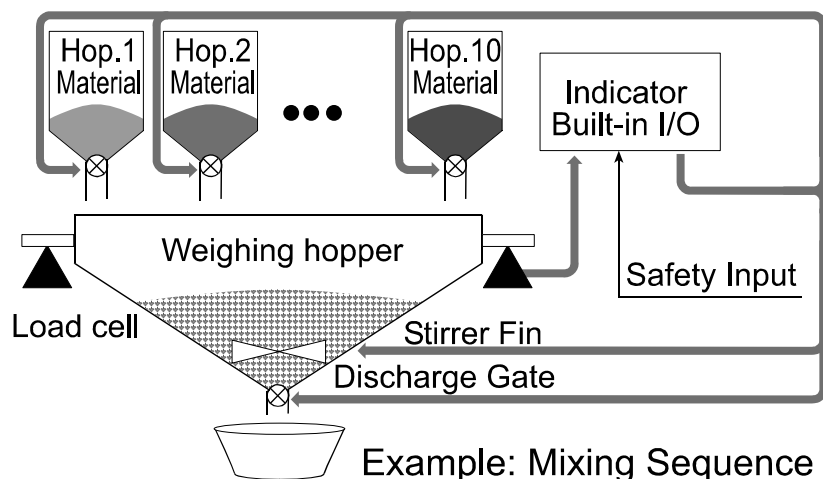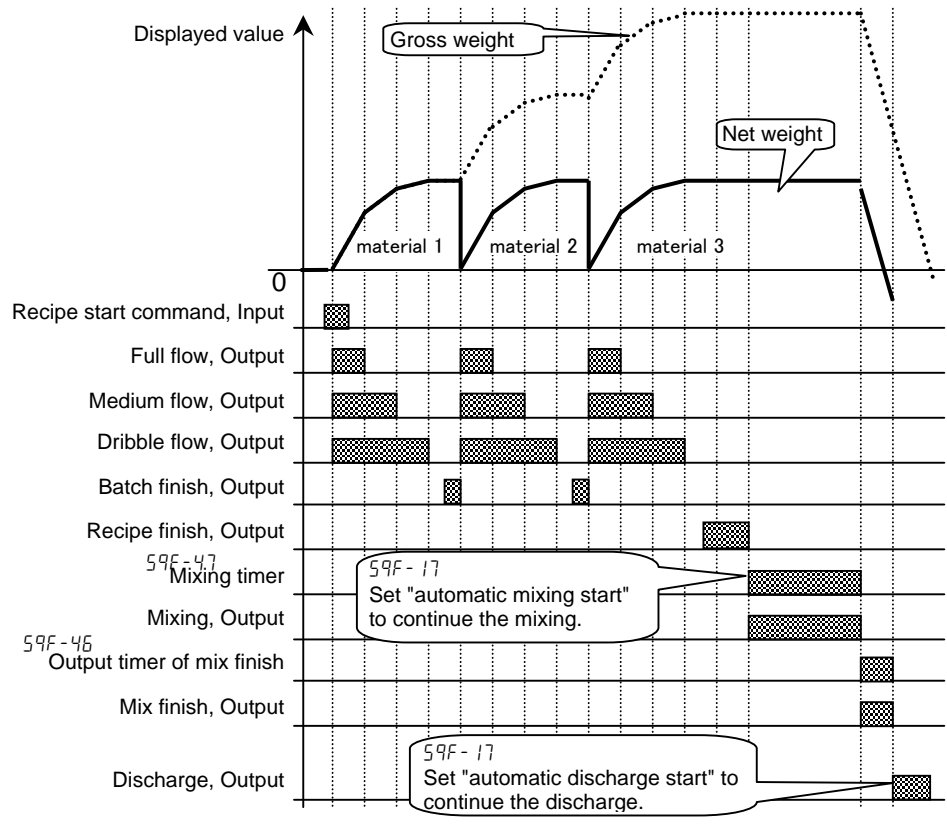
7.3.10. Safety Check Function

❑ This function is used to stop the sequence when an error or an emergency happens.
❑ When the function is in operation, an error code is displayed and an error signal is output from the preset I/O terminal that `weighing 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`.
❑ A maximum of eight input terminals can be used.
❑ The safety check functions are as follows:

Code	Classification	Action
`59F-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.
`59F-72`	Condition of the discharge	
`59F-73`	Condition of the recipe (compound)	
`59F-74`	Condition of the mix	
`59F-75`	Condition of the whole sequence	

```
 ┌─────────────┐
 │  Indicator  │
 │Error display│
 └─────────────┘
    ↑        │ Sequence error output
    │        └──────────────────────→
 Safety check inputs
 └───────────────────┘
```
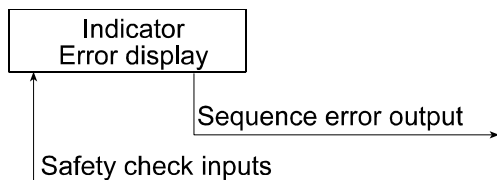
Examlpe: Safety check

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 output and No. `alarm 19` is displayed.
When the emergency stop is canceled, the status moves to the pause (temporary stop).
❑ Refer to "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.
[`In F`-nn] [`22`] `Pause` (Temporary stop)
[`In 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 is used to start from the point where 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 adjusts the free fall parameter using the average of the last four displayed values so as to obtain a more precise weighing.

Concerning Parameters of the Function

□ Using the automatic free fall compensation
[59 F-20] [1]   Average of last 4 FFalls (free falls)
[Function] - [Function setting] - [Sequence] - [Control] - [Free fall compensation]

□ Using the automatic free fall range
[Function] - [Function setting] - [MatEDIT] - [Code No.] - [AFFC range]
Refer to "6.1.5.Editing Full Parameters of Material Code"

□ Using the manual free fall
[59 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.
[59 F- 9] [1]   Change FFall
When using the flash memory, set to [OtHF-11] [2].
[Function] - [Function setting] - [Sequence] - [Basic] - [Material code, free fall value]

Advice

□ When the automatic free fall compensation cannot work.
  □ Check the fluctuation of dribble flow.
    When the error (| result - final value |) of the displayed value is greater than this parameter, the function does not work.
  □ Check if the dribble flow timer is too short.
    When the timer is shorter than Dflow auto-FFall override [59 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 short, the function cannot work correctly.

□ When the result becomes over, even if automatic free fall compensation is used.
  □ Remove the timer between preliminary and free fall
    When the values of preliminary and free fall are near, medium flow only works to reach the final value and the dribble flow cannot work.

7.3.14. Real Time Free Fall Compensation

❑ This function adjusts the free fall parameter to obtain more precise weighing during the sequence (in real-time calculation).
Example: This function fits a liquid weighing (water, cement, tar) where the flow rate is not constant due to temperature, viscosity and the remains.
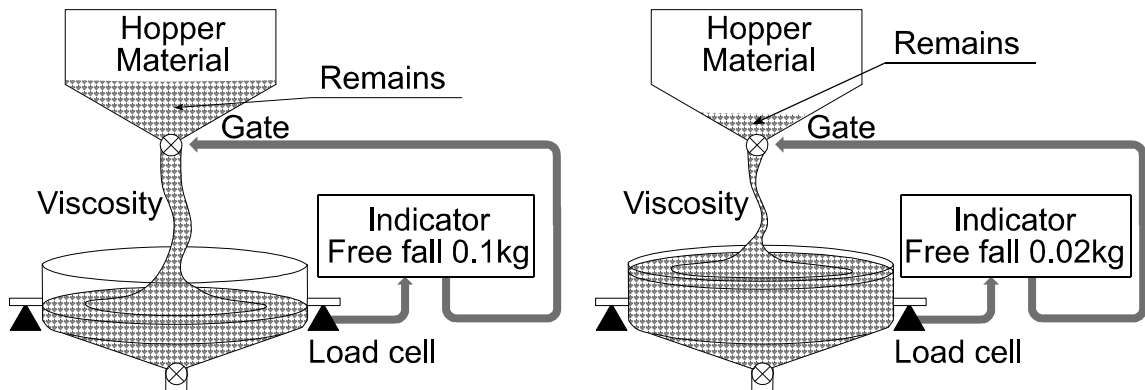
Example: Real Time Free Fall Compensation

Concerning Parameters of the Function

❑ Using the real time free fall compensation.
[59 F-20] [2]   Real time FFall compensation
[Function] - [Function setting] - [Sequence] - [Control] - [Free fall compensation]

❑ Using the automatic free fall range
[Function] - [Function setting] - [MatEDIT] - [Code No.] - [AFFC range]
Refer to "6.1.5. Editing Full Parameters of Material Code".

❑ Storing the results of the automatic free fall compensation of each material.
[59 F- 9] [1]   Change FFall
When using the flash memory, set to [OtHF-11] [2].
[Function] - [Function setting] - [Sequence] - [Basic] - [Memory of free fall value by material code]

Advice

❑ 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 cannot work correctly.

❑ When the dribble flow timer is shorter than the Dflow auto-FFall override [59 F-36].
The default free fall compensation value of each material code is used.

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- 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.
- If the control I/O signal output power 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 cannot be used in the "customer programmed control"**

Advice
- 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, then 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
[59F- 1] [1]   Customer programmed control
[59F- 3] [0]   Normal batch weighing
         [Function] - [Function setting] - [Sequence] - [Basic]

❏ Changing waiting time of judgment
[59F-37]   Eval delay timer
         [Function] - [Function setting] - [Sequence] - [Timer]

❏ Changing the pulse width of batch finish output
[59F-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.
[59F- 5]   Comparison
         [Function] - [Function setting] - [Sequence] - [Basic]

❏ Changing the accuracy of the comparison
[59F-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
[In F-nn] [10]   Manual free fall compensation
[OS 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]
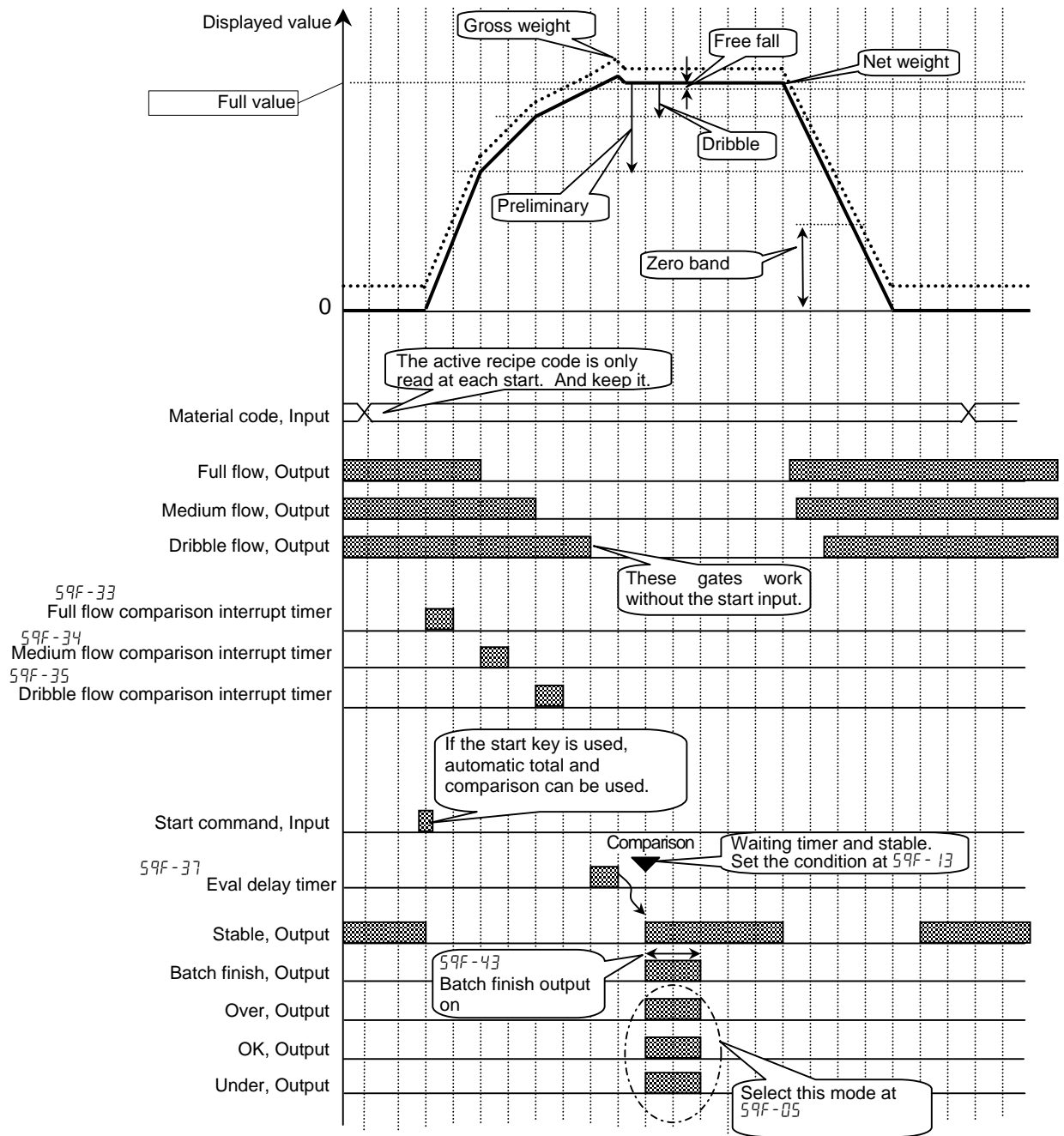
Drawing: Normal Batching of the Comparison Function

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
   [59F- 1] [1]   Customer programmed control
   [59F- 3] [1]   Loss-in-weigh
                    [Function] - [Function setting] - [Sequence] - [Basic]

❑ Using the external control switch for normal batch and loss-in-weigh.
   [59F- 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.
   [59F-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
   [In 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.
   [59F-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
   [59F-48]   Averaging Eval time
                    The average time to evaluate the weight.
                    [Function] - [Function setting] - [Sequence] - [Timer]

❑ Using manual compensation
   [In 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]

Advice

❑ 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. [In 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 [59F-32] Batch start delay timer.
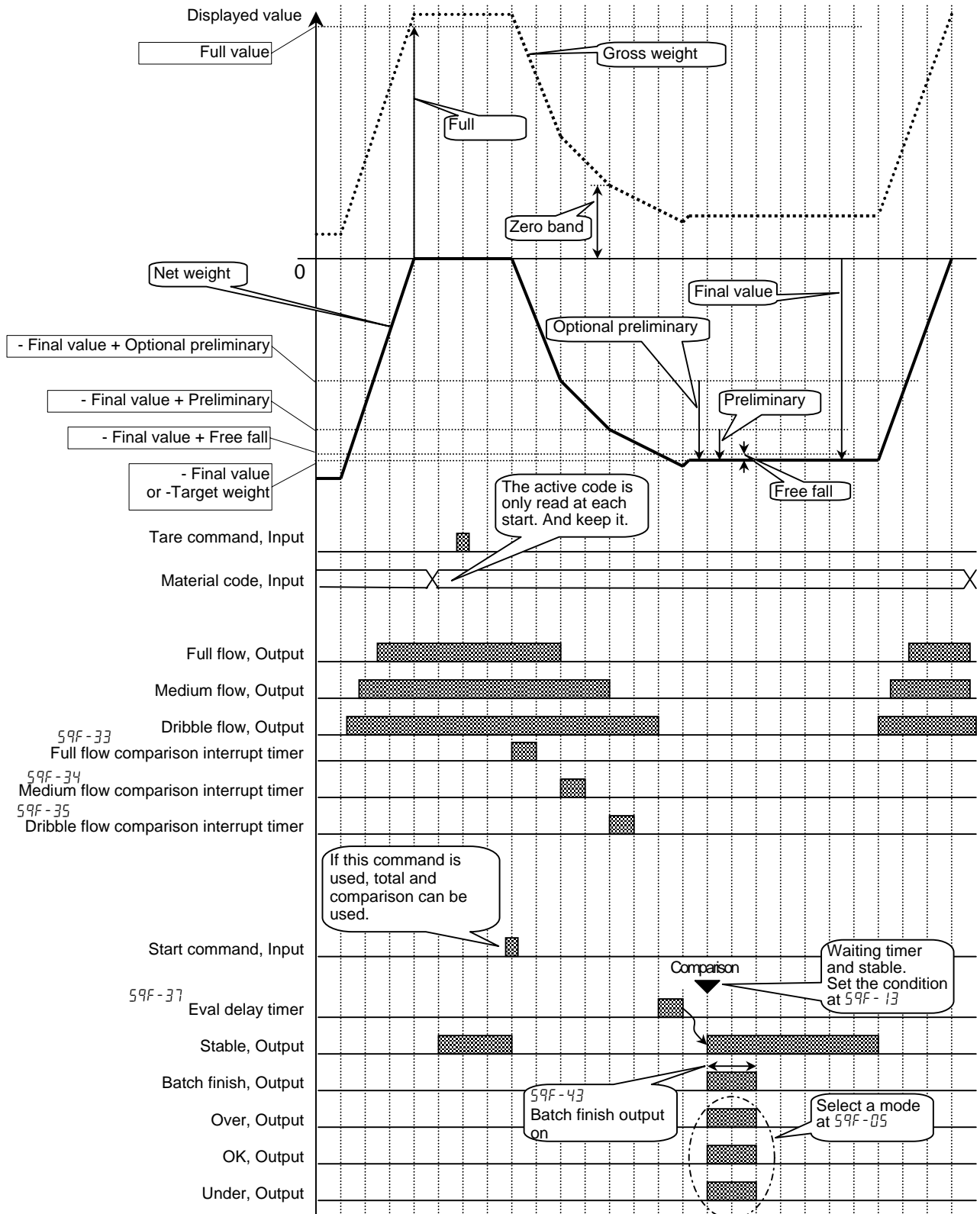
7.5.1. Re-Zero Operation

□ 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` [`In F-`nn] [`2`].

nn: terminal number of I/O.

Caution

□ **When the internal A/D converter is out of range, the re-zero operation cannot be 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 gross display at zero.

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 in 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 "10.5. Parameter List" of the function list regarding key functions.

Concerning Parameters of the Function

❑ Setting F1, F2, F3 and F4 keys
[*OtHF- 2*] to [*OtHF- 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 "10.5. Parameter List" of the function list regarding these items.

Item index number to be displayed. A maximum of 32 items of name and number can be set.
At **odd**: Input the name of the selected item using alphanumerical characters.
At **even**: Input the number concerning the item.

Information of key operation

```
Sub F 1
Sub F1-3  [name]
hopper        /Row/Col/Dig
          19   0  16   5
```

Name of the item

Items to append to sub-display

Resize the item selected.
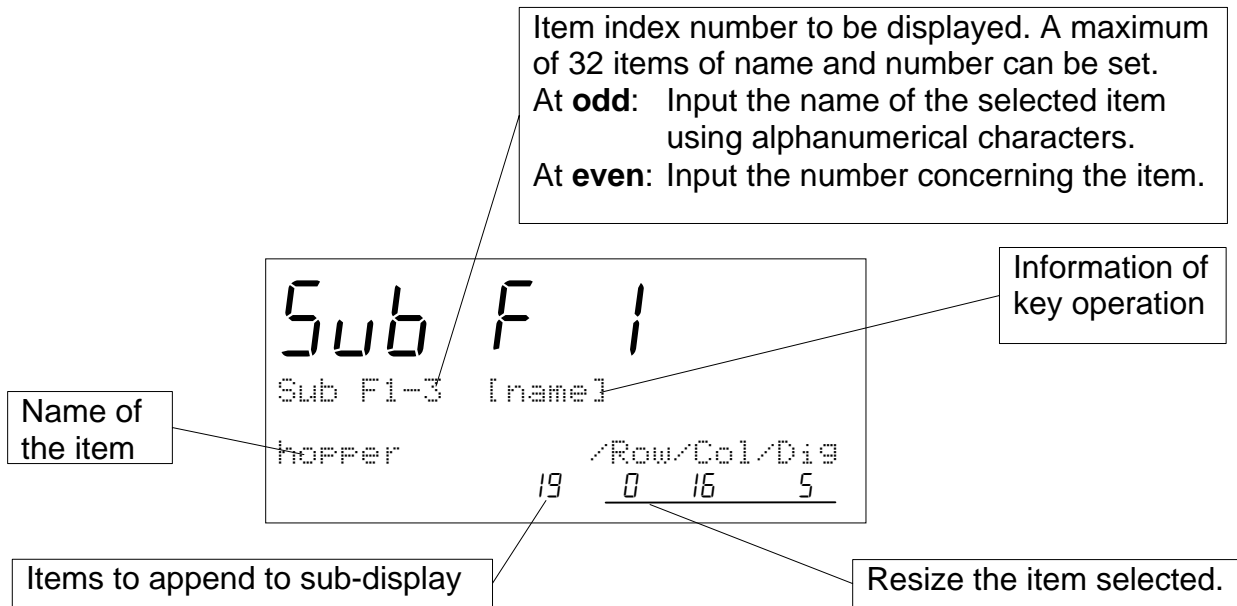
Row and Column Address

	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	Columsize	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			

AD-4402

Number	Name and Number to Display the Item	Row size	Columsize	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

[SubF- 1] [1]   Weighing display

[Function] - [Function setting] - [General] - [Sub-display]

7.5.7.   Graphic Display

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

Example:
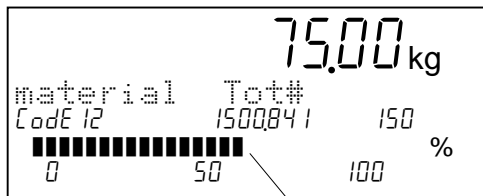
Bar graph

Concerning Parameters of the Function

□ Using the bar graph display

[SubF- 3]   Bar graph location

[Function] - [Function setting] - [General] - [Sub-display]

□ Selecting the ratio of the graph display

[SubF- 4]   Ratio of graph display

[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
  [*OtHF- 2*] to [*OtHF- 5*]
                    [Function] - [Function setting] - [General] - [Other]

❑ Using the I/O terminals for total
  [*In F*-nn]   nn: terminal number of the I/O.
                    [Function] - [Function setting] - [Control I/O] - [Input]

❑ Using the parallel terminals for total
  [*OS 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 "10.5. 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 methods to clear the data.
❑ Assign an operation input to undo the last result on the function list.
   Refer to "10.5. 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 reaches a preset condition, it is announced with a preset alarm.

Kind of error | Error no. | Weighing error | Error no. | Alarm 1 | Error no.

SQ.ERR — Over or under amount in the result

SQ.ERR ALARM 1 — Out of range

Error message is displayed — Stop key

Principle alarm blinks, when multiple alarms are active.
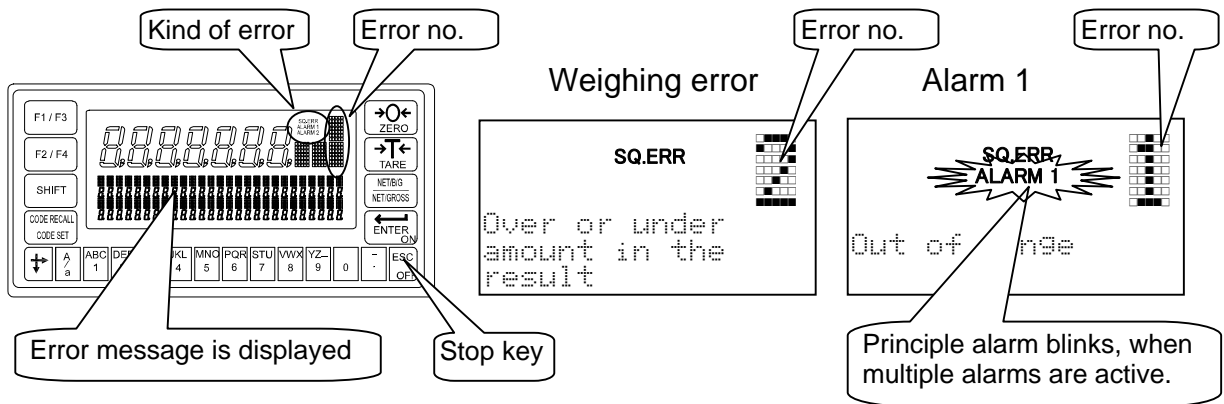
Kind of Alarm and Error

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 cannot 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 cannot be completed. Check the safety.
	2	Under weight or over weight. Compensate the weight and restart.
	3	There is a conflict in setpoint Check the setpoint
	4	Time over of batch weighing. Check the gate and the remains in the 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 cannot be set to zero with re-zero or tare, the message is displayed.
	0	Display cannot be zeroed by zero compensation.
	1	Display cannot 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**		Weighing can not be preformed. Check the weighing system. Example: load cell cable, connctors.
	1	A/D converter is positve over count. Check the load cell cable.
	2	A/D converter is negative over count. Check the load cell 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.

Graphic indicator

Over	OK	Under	Full flow	Medium flow	Dribble flow
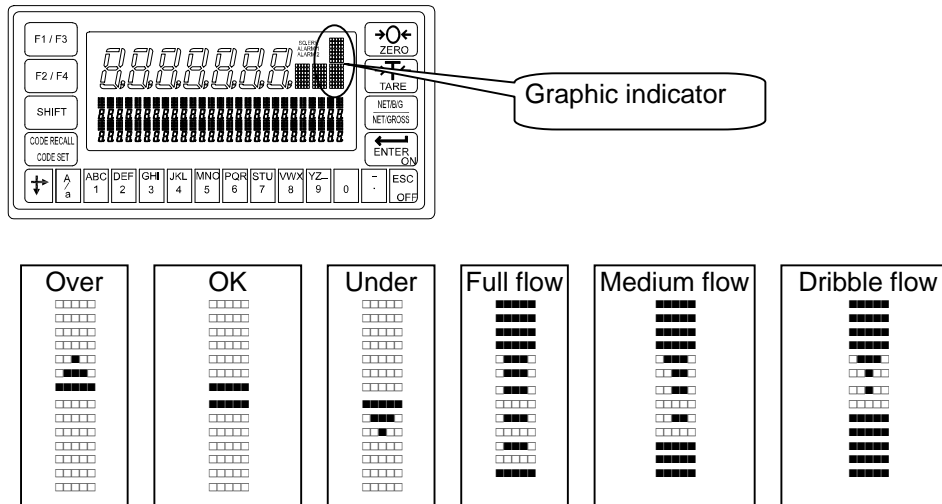
Concerning Parameters of the Function

❑ 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 ℃, 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

[𝙾𝚝𝙷𝙵- 𝟷𝟷]   Save data
[Function] - [Function setting] - [General] - [Other]

8.   Interface

8.1. Control I/O Function

Input terminals   11 lines that can be selected by the function
Output terminals   11 lines that can be selected by the function
                         Open collector transister

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

Max. 8 ~ 14V

Max. 5 mA

A1 ~ A 11
Input terminal

A12
Input common terminal

Interface circuit in
the indicator

A12   A1

B12   CONTROL I/O   B1

It is recommend that you use :
Mechanical switch or
open collector transistor.
Vsat < 2 V

Max. 40V DC

Max. 50 mA

B1 ~ B 11
Output terminal

Vsat < 1.5 V at 50 mA

B12
Output common terminal

It is recommend that you use :
Mechanical relay with surge diode or
photo coupler.

Use a surge diode to protect the
solenoid or relay from noise.

The function assigned to terminals

The function of the terminal can be assigned arbitrarily. Refer to "10.5. 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 a 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 an AD-7491 or a converter of RS-232C/ RS-485 on the 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

Terminals   Interface Circuit

The host computer may have inverse polarity terminals.

The host computer may include the terminator resistor.

Terminator resistor 100 ~ 120Ω 1/2W

Host computer
SDA
SDB
SG
FG

AD-4402
Address 1
SDA
SDB
SG
FG

Use twisted-pair wire.
Use shielded cable, if it is needed.

AD-4402
Address 2
SDA
SDB
SG
FG

Connect a terminator resistor at the indicator that is longest distance from the host computer.

AD-4402
Address 32
SDA
SDB
SG
FG

Terminator resistor 100 ~ 120Ω 1/2W

System Connections

8.2.2.   Settings of Parameters

Refer to "10.5. 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 (tr).   [⌐5 F- 9] < tr < [⌐5 F- 9] + 50 ms
- ❑ Use a long delay time, when there is noise.
- ❑ Hi-Z: Hi impedance
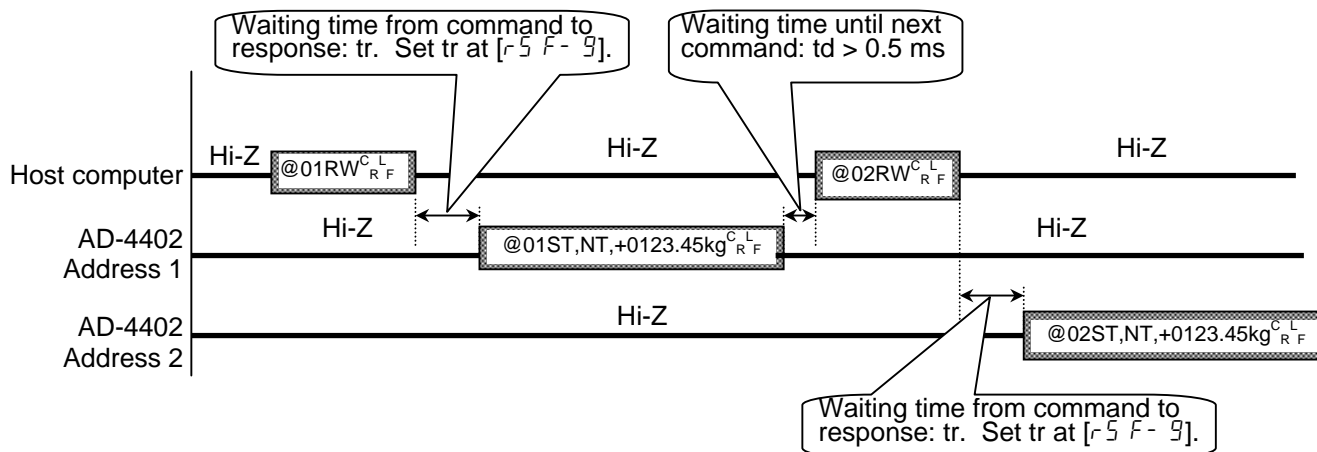
Communication Modes

- ❑ 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.

AD–4402

8.2.4. General Data Format

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

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	27	28
R	G	R	S	0	0	9	9	,	1	2	3	4	5	6	7	,	1	2	3	4	5	6	7	8	9	CR	LF

Header — Code — Weighing data — Terminator

System Monitor
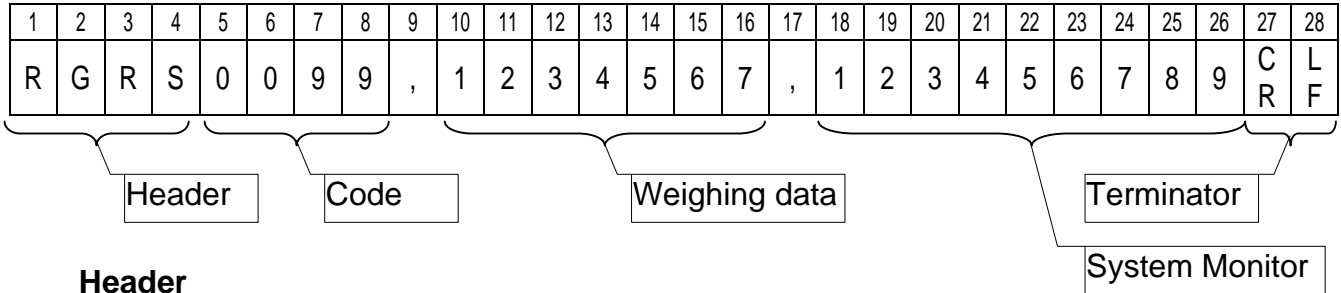
Header
Command is echoed. The echoed command is 4 characters

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

Example: $2^3\, 2^2\, 2^1\, 2^0$
1 0 1 0 = **A**h
ASCII code = **3A**h.
Upper 4 bits are **3**h always.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

2^0: Stable
2^1: Zero band
2^2: Full
2^3: Full flow

2^0: Medium flow
2^1: Dribble flow
2^2: Over
2^3: OK

2^0: Under
2^1: Internal reservation
2^2: Internal reservation
2^3: Mixing

2^0: Discharge gate
2^1: Batch finish
2^2: Recipe finish
2^3: Discharge finish

2^0: Mixing finish
2^1: Nozzle down
2^2: Online
2^3: During weighing sequence

2^0: Internal reservation
2^1: Weighing error
2^2: Alarm 1
2^3: Alarm 2

2^0: Zero error
2^1: Out of range
2^2: Buzzer
2^3: During tare

2^0: Center of zero
2^1: Gross display
2^2: net display
2^3: During hold

Internal reservation

Terminator
CR or CR + LF   CR: **0D**h,   LF: **0A**h

8.2.5. A&D Data Format

This format is used for stream mode, auto print mode and total print.
This format is compatible with 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   Header 2   Weighing data   Unit   Terminator

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 (**20**h).

Unit
kg, g or t

Terminator
CR or CR + LF   CR: **0D**h, LF: **0A**h

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 @oo is used, a command is sent to all indicators at the same time.
Example:

@	0	0	C	T	A	R	CR	LF

Address

                     AD–4402

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:   Command compatible with 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 **20**h).
%%%%:   When storing new parameters to material code or recipe code that is recalled as next code in the sequence, place four space codes (ASCII **20**h).
#1:   Command compatible with 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
Recall material code	CCODxxxx	
	CCxx	#1
Recall 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:   Command compatible with 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	○

□ Modbus is a kind of connection that is used with the RS-485 serial interface.

□ Communication mode is Modbus RTU.

□ The communication uses the memorires of the monitor unit or computer. Therefore, no special program is necessary for communication.

□ Data is specified with reference No. and address No.

□ The connection for Modbus is as follows.

Note: Modbus is a registered trademark of Modicon Inc.

Operator interface panel
MONITOUCH V6 Series
manufactured by
Hakko Electronics Co., Ltd

The AD-4402 uses the standard RS-485 serial interface

A maximum of 31 units can be connected.
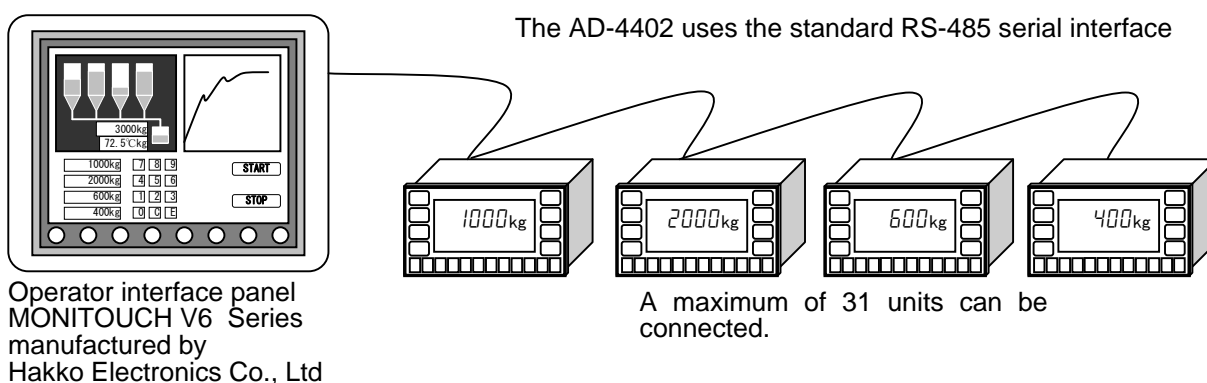
Networking example with Modbus used

□ Set the following parameters of RS-485 interface. Refer to "10. Function List."

Function and parameter		Description
rS F-1	Output data	Select either parameter.
rS F-2	Communication mode 7: Modbus	Set Modbus.
rS F-3	Baud rate	Select either parameter.
rS F-4	Parity check	
rS F-5	Character length	
rS F-6	Stop bits	
rS F-7	Terminator	
rS F-8	Address	Set unique address number.

Reference No.

Type	Reference No.	Description
Coil	0	The same as input bits of control I/O
Input status	1	The same as output bits of control I/O
Input register	3	Register to read data
Holding register	4	Register to read and write data

Coil (Reference No.=0. Output bits)

address	Description	address	Description
1	Zero	13	Not used
2	(Internal reservation)	14	Pause
3	Tare	15	Restart
4	Tare Clear	16	Forced batch finish
5	Batch start	17	Forced recipe finish
6	Recipe start	18	Forced discharge finish
7	Discharge start	19	Error reset
8	Mixing start	20	Hold / Release
9	Manual free fall compensation	21	Manual print command
10	Total command	22	Net / Gross
11	Cancel the last result	23	Clear totals of all material codes
12	Not used	24	Clear totals of all recipe codes

Input Status (Reference No.＝1)

address	Description
17	Stable
18	Zero band
19	Full (Full filling)
20	Full flow
21	Medium flow
22	Dribble flow
23	Over
24	OK
25	Under
26	Not used
27	Not used
28	Mixing
29	Discharge (Open the discharge gate)
30	Batch finish
31	Recipe finish
32	Discharge finish
33	Mixing finish
34	Nozzle down
35	Online (pulse)
36	Weighing sequence in process
37	Not used
38	Weighing sequence error
39	Alarm 1
40	Alarm 2
41	Zero error
42	Capacity over flow
43	Buzzer
44	Tare Entered
45	Center zero
46	Gross display
47	Net display
48	During hold
49～64	Total status of Material code 0
49	Totaling
50	Total weight overflow
51	Total count overflow
52	Not used
53	Not used
54	Not used
55	Not used
56	Not used
57	Not used
58	Not used
59	Not used
60	Not used
61	Not used

address	Description
62	Not used
63	Not used
64	Not used
305～320	Total status of Material code 1
561～576	Total status of Material code 2
817～832	Total status of Material code 3
1073～1088	Total status of Material code 4
1329～1344	Total status of Material code 5
1585～1600	Total status of Material code 6
1841～1856	Total status of Material code 7
2097～2112	Total status of Material code 8
2353～2368	Total status of Material code 9
2609～2624	Total status of Material code 10
2865～2880	Total status of Material code 11
3121～3136	Total status of Material code 12
3377～3392	Total status of Material code 13
3633～3648	Total status of Material code 14
3889～3904	Total status of Material code 15
4145～4160	Total status of Material code 16
4401～4416	Total status of Material code 17
4657～4672	Total status of Material code 18
4913～4928	Total status of Material code 19
5169～5184	Total status of Material code 20
5425～5440	Total status of Material code 21
5681～5696	Total status of Material code 22
5937～5952	Total status of Material code 23
6193～6208	Total status of Material code 24
6449～6464	Total status of Material code 25
6705～6720	Total status of Material code 26
6961～6976	Total status of Material code 27
7217～7232	Total status of Material code 28
7473～7488	Total status of Material code 29
7729～7744	Total status of Material code 30
7985～8000	Total status of Material code 31
8241～8256	Total status of Material code 32
8497～8512	Total status of Material code 33
8753～8768	Total status of Material code 34
9009～9024	Total status of Material code 35
9265～9280	Total status of Material code 36
9521～9536	Total status of Material code 37
9777～9792	Total status of Material code 38
10033～10048	Total status of Material code 39
10289～10304	Total status of Material code 40
10545～10560	Total status of Material code 41
10801～10816	Total status of Material code 42
11057～11072	Total status of Material code 43

Input Status (Reference No.=1)

address	Description	address	Description
11313～11328	Total status of Material code 44	22833～22848	Total status of Material code 89
11569～11584	Total status of Material code 45	23089～23104	Total status of Material code 90
11825～11840	Total status of Material code 46	23345～23360	Total status of Material code 91
12081～12096	Total status of Material code 47	23601～23616	Total status of Material code 92
12337～12352	Total status of Material code 48	23857～23872	Total status of Material code 93
12593～12608	Total status of Material code 49	24113～24128	Total status of Material code 94
12849～12864	Total status of Material code 50	24369～24384	Total status of Material code 95
13105～13120	Total status of Material code 51	24625～24640	Total status of Material code 96
13361～13376	Total status of Material code 52	24881～24896	Total status of Material code 97
13617～13632	Total status of Material code 53	25137～25152	Total status of Material code 98
13873～13888	Total status of Material code 54	25393～25408	Total status of Material code 99
14129～14144	Total status of Material code 55	25649～25664	Total status of Recipe code 0
14385～14400	Total status of Material code 56	25649	Totaling
14641～14656	Total status of Material code 57	25650	Total weight overflow
14897～14912	Total status of Material code 58	25651	Total count overflow
15153～15168	Total status of Material code 59	25652	Not used
15409～15424	Total status of Material code 60	25653	Not used
15665～15680	Total status of Material code 61	25654	Not used
15921～15936	Total status of Material code 62	25655	Not used
16177～16192	Total status of Material code 63	25656	Not used
16433～16448	Total status of Material code 64	25657	Not used
16689～16704	Total status of Material code 65	25658	Not used
16945～16960	Total status of Material code 66	25659	Not used
17201～17216	Total status of Material code 67	25660	Not used
17457～17472	Total status of Material code 68	25661	Not used
17713～17728	Total status of Material code 69	25662	Not used
17969～17984	Total status of Material code 70	25663	Not used
18225～18240	Total status of Material code 71	25664	Not used
18481～18496	Total status of Material code 72	25905～25920	Total status of Recipe code 1
18737～18752	Total status of Material code 73	26161～26176	Total status of Recipe code 2
18993～19008	Total status of Material code 74	26417～26432	Total status of Recipe code 3
19249～19264	Total status of Material code 75	26673～26688	Total status of Recipe code 4
19505～19520	Total status of Material code 76	26929～26944	Total status of Recipe code 5
19761～19776	Total status of Material code 77	27185～27200	Total status of Recipe code 6
20017～20032	Total status of Material code 78	27441～27456	Total status of Recipe code 7
20273～20288	Total status of Material code 79	27697～27712	Total status of Recipe code 8
20529～20544	Total status of Material code 80	27953～27968	Total status of Recipe code 9
20785～20800	Total status of Material code 81	28209～28224	Total status of Recipe code 10
21041～21056	Total status of Material code 82	28465～28480	Total status of Recipe code 11
21297～21312	Total status of Material code 83	28721～28736	Total status of Recipe code 12
21553～21568	Total status of Material code 84	28977～28992	Total status of Recipe code 13
21809～21824	Total status of Material code 85	29233～29248	Total status of Recipe code 14
22065～22080	Total status of Material code 86	29489～29504	Total status of Recipe code 15
22321～22336	Total status of Material code 87	29745～29760	Total status of Recipe code 16
22577～22592	Total status of Material code 88	30001～30016	Total status of Recipe code 17

Input Status (Reference No.＝1)

address	Description	address	Description
30257～30272	Total status of Recipe code 18	41777～41792	Total status of Recipe code 63
30513～30528	Total status of Recipe code 19	42033～42048	Total status of Recipe code 64
30769～30784	Total status of Recipe code 20	42289～42304	Total status of Recipe code 65
31025～31040	Total status of Recipe code 21	42545～42560	Total status of Recipe code 66
31281～31296	Total status of Recipe code 22	42801～42816	Total status of Recipe code 67
31537～31552	Total status of Recipe code 23	43057～43072	Total status of Recipe code 68
31793～31808	Total status of Recipe code 24	43313～43328	Total status of Recipe code 69
32049～32064	Total status of Recipe code 25	43569～43584	Total status of Recipe code 70
32305～32320	Total status of Recipe code 26	43825～43840	Total status of Recipe code 71
32561～32576	Total status of Recipe code 27	44081～44096	Total status of Recipe code 72
32817～32832	Total status of Recipe code 28	44337～44352	Total status of Recipe code 73
33073～33088	Total status of Recipe code 29	44593～44608	Total status of Recipe code 74
33329～33344	Total status of Recipe code 30	44849～44864	Total status of Recipe code 75
33585～33600	Total status of Recipe code 31	45105～45120	Total status of Recipe code 76
33841～33856	Total status of Recipe code 32	45361～45376	Total status of Recipe code 77
34097～34112	Total status of Recipe code 33	45617～45632	Total status of Recipe code 78
34353～34368	Total status of Recipe code 34	45873～45888	Total status of Recipe code 79
34609～34624	Total status of Recipe code 35	46129～46144	Total status of Recipe code 80
34865～34880	Total status of Recipe code 36	46385～46400	Total status of Recipe code 81
35121～35136	Total status of Recipe code 37	46641～46656	Total status of Recipe code 82
35377～35392	Total status of Recipe code 38	46897～46912	Total status of Recipe code 83
35633～35648	Total status of Recipe code 39	47153～47168	Total status of Recipe code 84
35889～35904	Total status of Recipe code 40	47409～47424	Total status of Recipe code 85
36145～36160	Total status of Recipe code 41	47665～47680	Total status of Recipe code 86
36401～36416	Total status of Recipe code 42	47921～47936	Total status of Recipe code 87
36657～36672	Total status of Recipe code 43	48177～48192	Total status of Recipe code 88
36913～36928	Total status of Recipe code 44	48433～48448	Total status of Recipe code 89
37169～37184	Total status of Recipe code 45	48689～48704	Total status of Recipe code 90
37425～37440	Total status of Recipe code 46	48945～48960	Total status of Recipe code 91
37681～37696	Total status of Recipe code 47	49201～49216	Total status of Recipe code 92
37937～37952	Total status of Recipe code 48	49457～49472	Total status of Recipe code 93
38193～38208	Total status of Recipe code 49	49713～49728	Total status of Recipe code 94
38449～38464	Total status of Recipe code 50	49969～49984	Total status of Recipe code 95
38705～38720	Total status of Recipe code 51	50225～50240	Total status of Recipe code 96
38961～38976	Total status of Recipe code 52	50481～50496	Total status of Recipe code 97
39217～39232	Total status of Recipe code 53	50737～50752	Total status of Recipe code 98
39473～39488	Total status of Recipe code 54	50993～51008	Total status of Recipe code 99
39729～39744	Total status of Recipe code 55		
39985～40000	Total status of Recipe code 56		
40241～40256	Total status of Recipe code 57		
40497～40512	Total status of Recipe code 58		
40753～40768	Total status of Recipe code 59		
41009～41024	Total status of Recipe code 60		
41265～41280	Total status of Recipe code 61		
41521～41536	Total status of Recipe code 62		

AD-4402

Input Register (Reference No.＝3)　　To read data

address	Description	address	Description
1	Decimal point	7201～7216	Total data of Material code 28
2	Unit　0:blank, 1:g, 2:kg, 3:t, 4:lb	7457～7472	Total data of Material code 29
3	Tare weight	7713～7728	Total data of Material code 30
5	Gross weight	7969～7984	Total data of Material code 31
7	Net weight	8225～8240	Total data of Material code 32
9	Active Material code No.	8481～8496	Total data of Material code 33
10	Active Recipe code No.	8737～8752	Total data of Material code 34
11	Active Hopper No.	8993～9008	Total data of Material code 35
12	Sequence error No.	9249～9264	Total data of Material code 36
13	Zero error No.	9505～9520	Total data of Material code 37
14	Alarm 1 No.	9761～9776	Total data of Material code 38
15	Alarm 2 No.	10017～10032	Total data of Material code 39
16	Operation mode 0:Enable, 1:Unable	10273～10288	Total data of Material code 40
17	Weight of batch result	10529～10544	Total data of Material code 41
33～48	Total data of Material code 0	10785～10800	Total data of Material code 42
33	Total weight	11041～11056	Total data of Material code 43
35	Total count	11297～11312	Total data of Material code 44
289～304	Total data of Material code 1	11553～11568	Total data of Material code 45
545～560	Total data of Material code 2	11809～11824	Total data of Material code 46
801～816	Total data of Material code 3	12065～12080	Total data of Material code 47
1057～1072	Total data of Material code 4	12321～12336	Total data of Material code 48
1313～1328	Total data of Material code 5	12577～12592	Total data of Material code 49
1569～1584	Total data of Material code 6	12833～12848	Total data of Material code 50
1825～1840	Total data of Material code 7	13089～13104	Total data of Material code 51
2081～2096	Total data of Material code 8	13345～13360	Total data of Material code 52
2337～2352	Total data of Material code 9	13601～13616	Total data of Material code 53
2593～2608	Total data of Material code 10	13857～13872	Total data of Material code 54
2849～2864	Total data of Material code 11	14113～14128	Total data of Material code 55
3105～3120	Total data of Material code 12	14369～14384	Total data of Material code 56
3361～3376	Total data of Material code 13	14625～14640	Total data of Material code 57
3617～3632	Total data of Material code 14	14881～14896	Total data of Material code 58
3873～3888	Total data of Material code 15	15137～15152	Total data of Material code 59
4129～4144	Total data of Material code 16	15393～15408	Total data of Material code 60
4385～4400	Total data of Material code 17	15649～15664	Total data of Material code 61
4641～4656	Total data of Material code 18	15905～15920	Total data of Material code 62
4897～4912	Total data of Material code 19	16161～16176	Total data of Material code 63
5153～5168	Total data of Material code 20	16417～16432	Total data of Material code 64
5409～5424	Total data of Material code 21	16673～16688	Total data of Material code 65
5665～5680	Total data of Material code 22	16929～16944	Total data of Material code 66
5921～5936	Total data of Material code 23	17185～17200	Total data of Material code 67
6177～6192	Total data of Material code 24	17441～17456	Total data of Material code 68
6433～6448	Total data of Material code 25	17697～17712	Total data of Material code 69
6689～6704	Total data of Material code 26	17953～17968	Total data of Material code 70
6945～6960	Total data of Material code 27		

Input Register (Reference No.=3)　　To read data

address	Description	address	Description
18209～18224	Total data of Material code 71	28705～28720	Total data of Recipe code 12
18465～18480	Total data of Material code 72	28961～28976	Total data of Recipe code 13
18721～18736	Total data of Material code 73	29217～29232	Total data of Recipe code 14
18977～18992	Total data of Material code 74	29473～29488	Total data of Recipe code 15
19233～19248	Total data of Material code 75	29729～29744	Total data of Recipe code 16
19489～19504	Total data of Material code 76	29985～30000	Total data of Recipe code 17
19745～19760	Total data of Material code 77	30241～30256	Total data of Recipe code 18
20001～20016	Total data of Material code 78	30497～30512	Total data of Recipe code 19
20257～20272	Total data of Material code 79	30753～30768	Total data of Recipe code 20
20513～20528	Total data of Material code 80	31009～31024	Total data of Recipe code 21
20769～20784	Total data of Material code 81	31265～31280	Total data of Recipe code 22
21025～21040	Total data of Material code 82	31521～31536	Total data of Recipe code 23
21281～21296	Total data of Material code 83	31777～31792	Total data of Recipe code 24
21537～21552	Total data of Material code 84	32033～32048	Total data of Recipe code 25
21793～21808	Total data of Material code 85	32289～32304	Total data of Recipe code 26
22049～22064	Total data of Material code 86	32545～32560	Total data of Recipe code 27
22305～22320	Total data of Material code 87	32801～32816	Total data of Recipe code 28
22561～22576	Total data of Material code 88	33057～33072	Total data of Recipe code 29
22817～22832	Total data of Material code 86	33313～33328	Total data of Recipe code 30
23073～23088	Total data of Material code 90	33569～33584	Total data of Recipe code 31
23329～23344	Total data of Material code 91	33825～33840	Total data of Recipe code 32
23585～23600	Total data of Material code 92	34081～34096	Total data of Recipe code 33
23841～23856	Total data of Material code 93	34337～34352	Total data of Recipe code 34
24097～24112	Total data of Material code 94	34593～34608	Total data of Recipe code 35
24353～24368	Total data of Material code 95	34849～34864	Total data of Recipe code 36
24609～24624	Total data of Material code 96	35105～35120	Total data of Recipe code 37
24865～24880	Total data of Material code 97	35361～35376	Total data of Recipe code 38
25121～25136	Total data of Material code 98	35617～35632	Total data of Recipe code 39
25377～25392	Total data of Material code 99	35873～35888	Total data of Recipe code 40
25633～25648	Total data of Recipe code 0	36129～36144	Total data of Recipe code 41
25633	Total weight	36385～36400	Total data of Recipe code 42
25635	Total count	36641～36656	Total data of Recipe code 43
25889～25904	Total data of Recipe code 1	36897～36912	Total data of Recipe code 44
26145～26160	Total data of Recipe code 2	37153～37168	Total data of Recipe code 45
26401～26416	Total data of Recipe code 3	37409～37424	Total data of Recipe code 46
26657～26672	Total data of Recipe code 4	37665～37680	Total data of Recipe code 47
26913～26928	Total data of Recipe code 5	37921～37936	Total data of Recipe code 48
27169～27184	Total data of Recipe code 6	38177～38192	Total data of Recipe code 49
27425～27440	Total data of Recipe code 7	38433～38448	Total data of Recipe code 50
27681～27696	Total data of Recipe code 8	38689～38704	Total data of Recipe code 51
27937～27952	Total data of Recipe code 9	38945～38960	Total data of Recipe code 52
28193～28208	Total data of Recipe code 10	39201～39216	Total data of Recipe code 53
28449～28464	Total data of Recipe code 11	39457～39472	Total data of Recipe code 54

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Input Register (Reference No.=3)　　To read data

address	Description		address	Description
39713～39728	Total data of Recipe code 55		50209～50224	Total data of Recipe code 96
39969～39984	Total data of Recipe code 56		50465～50480	Total data of Recipe code 97
40225～40240	Total data of Recipe code 57		50721～50736	Total data of Recipe code 98
40481～40496	Total data of Recipe code 58		50977～50992	Total data of Recipe code 99
40737～40752	Total data of Recipe code 59			
40993～41008	Total data of Recipe code 60			
41249～41264	Total data of Recipe code 61			
41505～41520	Total data of Recipe code 62			
41761～41776	Total data of Recipe code 63			
42017～42032	Total data of Recipe code 64			
42273～42288	Total data of Recipe code 65			
42529～42544	Total data of Recipe code 66			
42785～42800	Total data of Recipe code 67			
43041～43056	Total data of Recipe code 68			
43297～43312	Total data of Recipe code 69			
43553～43568	Total data of Recipe code 70			
43809～43824	Total data of Recipe code 71			
44065～44080	Total data of Recipe code 72			
44321～44336	Total data of Recipe code 73			
44577～44592	Total data of Recipe code 74			
44833～44848	Total data of Recipe code 75			
45089～45104	Total data of Recipe code 76			
45345～45360	Total data of Recipe code 77			
45601～45616	Total data of Recipe code 78			
45857～45872	Total data of Recipe code 79			
46113～46128	Total data of Recipe code 80			
46369～46384	Total data of Recipe code 81			
46625～46640	Total data of Recipe code 82			
46881～46896	Total data of Recipe code 83			
47137～47152	Total data of Recipe code 84			
47393～47408	Total data of Recipe code 85			
47649～47664	Total data of Recipe code 86			
47905～47920	Total data of Recipe code 87			
48161～48176	Total data of Recipe code 88			
48417～48432	Total data of Recipe code 89			
48673～48688	Total data of Recipe code 90			
48929～48944	Total data of Recipe code 91			
49185～49200	Total data of Recipe code 92			
49441～49456	Total data of Recipe code 93			
49697～49712	Total data of Recipe code 94			
49953～49968	Total data of Recipe code 95			

Holding Register (Reference No.＝4)　To write comparison data

address	Description	address	Description
1～48	Setpoints of Material code 0	5633～5680	Setpoints of Material code 22
1	Material name (character no. 1,2)	5889～5936	Setpoints of Material code 23
2	Material name (character no. 3,4)	6145～6192	Setpoints of Material code 24
3	Material name (character no. 5,6)	6401～6448	Setpoints of Material code 25
4	Material name (character no. 7,8)	6657～6704	Setpoints of Material code 26
5	Material name (character no. 9,10)	6913～6960	Setpoints of Material code 27
6	Material name (character no. 11,12)	7169～7216	Setpoints of Material code 28
7	Material hopper	7425～7472	Setpoints of Material code 29
9	Final	7681～7728	Setpoints of Material code 30
11	Free fall	7937～7984	Setpoints of Material code 31
13	Preliminary	8193～8240	Setpoints of Material code 32
15	Optional Preliminary	8449～8496	Setpoints of Material code 33
17	Over	8705～8752	Setpoints of Material code 34
19	Under	8961～9008	Setpoints of Material code 35
21	Zero Band	9217～9264	Setpoints of Material code 36
23	Full	9473～9520	Setpoints of Material code 37
25	Preset Tare	9729～9776	Setpoints of Material code 38
27	Supplementary flow open timer	9985～10032	Setpoints of Material code 39
29	Supplementary flow close timer	10241～10288	Setpoints of Material code 40
31	Automatic free fall range	10497～10544	Setpoints of Material code 41
37	Initial dribble flow	10753～10800	Setpoints of Material code 42
39	Initial medium flow	11009～11056	Setpoints of Material code 43
257～304	Setpoints of Material code 1	11265～11312	Setpoints of Material code 44
513～560	Setpoints of Material code 2	11521～11568	Setpoints of Material code 45
769～816	Setpoints of Material code 3	11777～11824	Setpoints of Material code 46
1025～1072	Setpoints of Material code 4	12033～12080	Setpoints of Material code 47
1281～1328	Setpoints of Material code 5	12289～12336	Setpoints of Material code 48
1537～1584	Setpoints of Material code 6	12545～12592	Setpoints of Material code 49
1793～1840	Setpoints of Material code 7	12801～12848	Setpoints of Material code 50
2049～2096	Setpoints of Material code 8	13057～13104	Setpoints of Material code 51
2305～2352	Setpoints of Material code 9	13313～13360	Setpoints of Material code 52
2561～2608	Setpoints of Material code 10	13569～13616	Setpoints of Material code 53
2817～2864	Setpoints of Material code 11	13825～13872	Setpoints of Material code 54
3073～3120	Setpoints of Material code 12	14081～14128	Setpoints of Material code 55
3329～3376	Setpoints of Material code 13	14337～14384	Setpoints of Material code 56
3585～3632	Setpoints of Material code 14	14593～14640	Setpoints of Material code 57
3841～3888	Setpoints of Material code 15	14849～14896	Setpoints of Material code 58
4097～4144	Setpoints of Material code 16	15105～15152	Setpoints of Material code 59
4353～4400	Setpoints of Material code 17	15361～15408	Setpoints of Material code 60
4609～4656	Setpoints of Material code 18	15617～15632	Setpoints of Material code 61
4865～4912	Setpoints of Material code 19	15873～15920	Setpoints of Material code 62
5121～5168	Setpoints of Material code 20	16129～16176	Setpoints of Material code 63
5377～5424	Setpoints of Material code 21	16385～16432	Setpoints of Material code 64

Holding Register (Reference No.=4) To write comparison data

address	Description	address	Description
16641～16688	Setpoints of Material code 65	25607	Material 1
16897～16944	Setpoints of Material code 66	25608	Material 2
17153～17200	Setpoints of Material code 67	25609	Material 3
17409～17456	Setpoints of Material code 68	25610	Material 4
17665～17712	Setpoints of Material code 69	25611	Material 5
17921～17968	Setpoints of Material code 70	25612	Material 6
18177～18192	Setpoints of Material code 71	25613	Material 7
18433～18480	Setpoints of Material code 72	25614	Material 8
18689～18736	Setpoints of Material code 73	25615	Material 9
18945～18992	Setpoints of Material code 74	25616	Material 10
19201～19248	Setpoints of Material code 75	25857～25872	Data of Recipe code 1
19457～19504	Setpoints of Material code 76	26113～26128	Data of Recipe code 2
19713～19760	Setpoints of Material code 77	26369～26384	Data of Recipe code 3
19969～20016	Setpoints of Material code 78	26625～26640	Data of Recipe code 4
20225～20272	Setpoints of Material code 79	26881～26896	Data of Recipe code 5
20481～20528	Setpoints of Material code 80	27137～27152	Data of Recipe code 6
20737～20752	Setpoints of Material code 81	27393～27408	Data of Recipe code 7
20993～21040	Setpoints of Material code 82	27649～27664	Data of Recipe code 8
21249～21296	Setpoints of Material code 83	27905～27920	Data of Recipe code 9
21505～21552	Setpoints of Material code 84	28161～28176	Data of Recipe code 10
21761～21808	Setpoints of Material code 85	28417～28432	Data of Recipe code 11
22017～22064	Setpoints of Material code 86	28673～28688	Data of Recipe code 12
22273～22320	Setpoints of Material code 87	28929～28944	Data of Recipe code 13
22529～22576	Setpoints of Material code 88	29185～29200	Data of Recipe code 14
22785～22832	Setpoints of Material code 89	29441～29456	Data of Recipe code 15
23041～23088	Setpoints of Material code 90	29697～29712	Data of Recipe code 16
23297～23312	Setpoints of Material code 91	29953～29968	Data of Recipe code 17
23553～23600	Setpoints of Material code 92	30209～30224	Data of Recipe code 18
23809～23856	Setpoints of Material code 93	30465～30480	Data of Recipe code 19
24065～24112	Setpoints of Material code 94	30721～30736	Data of Recipe code 20
24321～24368	Setpoints of Material code 95	30977～30992	Data of Recipe code 21
24577～24624	Setpoints of Material code 96	31233～31248	Data of Recipe code 22
24833～24880	Setpoints of Material code 97	31489～31504	Data of Recipe code 23
25089～25136	Setpoints of Material code 98	31745～31760	Data of Recipe code 24
25345～25392	Setpoints of Material code 99	32001～32016	Data of Recipe code 25
25601～25616	Data of Recipe code 0 Recipe name and Material codes	32257～32272	Data of Recipe code 26
25601	Recipe name (character no. 1,2)	32513～32528	Data of Recipe code 27
25602	Recipe name (character no. 3,4)	32769～32784	Data of Recipe code 28
25603	Recipe name (character no. 5,6)	33025～33040	Data of Recipe code 29
25604	Recipe name (character no. 7,8)	33281～33296	Data of Recipe code 30
25605	Recipe name (character no. 9,10)	33537～33552	Data of Recipe code 31
25606	Recipe name (character no. 11,12)	33793～33808	Data of Recipe code 32

Holding Register (Reference No.=4)　To write comparison data

address	Description	address	Description
34049～34064	Data of Recipe code 33	44289～44304	Data of Recipe code 73
34305～34320	Data of Recipe code 34	44545～44560	Data of Recipe code 74
34561～34576	Data of Recipe code 35	44801～44816	Data of Recipe code 75
34817～34832	Data of Recipe code 36	45057～45072	Data of Recipe code 76
35073～35088	Data of Recipe code 37	45313～45328	Data of Recipe code 77
35329～35344	Data of Recipe code 38	45569～45584	Data of Recipe code 78
35585～35600	Data of Recipe code 39	45825～45840	Data of Recipe code 79
35841～35856	Data of Recipe code 40	46081～46096	Data of Recipe code 80
36097～36112	Data of Recipe code 41	46337～46352	Data of Recipe code 81
36353～36368	Data of Recipe code 42	46593～46608	Data of Recipe code 82
36609～36624	Data of Recipe code 43	46849～46864	Data of Recipe code 83
36865～36880	Data of Recipe code 44	47105～47120	Data of Recipe code 84
37121～37136	Data of Recipe code 45	47361～47376	Data of Recipe code 85
37377～37392	Data of Recipe code 46	47617～47632	Data of Recipe code 86
37633～37648	Data of Recipe code 47	47873～47888	Data of Recipe code 87
37889～37904	Data of Recipe code 48	48129～48144	Data of Recipe code 88
38145～38160	Data of Recipe code 49	48385～48400	Data of Recipe code 89
38401～38416	Data of Recipe code 50	48641～48656	Data of Recipe code 90
38657～38672	Data of Recipe code 51	48897～48912	Data of Recipe code 91
38913～38928	Data of Recipe code 52	49153～49168	Data of Recipe code 92
39169～39184	Data of Recipe code 53	49409～49424	Data of Recipe code 93
39425～39440	Data of Recipe code 54	49665～49680	Data of Recipe code 94
39681～39696	Data of Recipe code 55	49921～49936	Data of Recipe code 95
39937～39952	Data of Recipe code 56	50177～50192	Data of Recipe code 96
40193～40208	Data of Recipe code 57	50433～50448	Data of Recipe code 97
40449～40464	Data of Recipe code 58	50689～50704	Data of Recipe code 98
40705～40720	Data of Recipe code 59	50945～50960	Data of Recipe code 99
40961～40976	Data of Recipe code 60	53249	Recall a Material code
41217～41232	Data of Recipe code 61	53250	Recall a Recipe code
41473～41488	Data of Recipe code 62		
41729～41744	Data of Recipe code 63		
41985～42000	Data of Recipe code 64		
42241～42256	Data of Recipe code 65		
42497～42512	Data of Recipe code 66		
42753～42768	Data of Recipe code 67		
43009～43024	Data of Recipe code 68		
43265～43280	Data of Recipe code 69		
43521～43536	Data of Recipe code 70		
43777～43792	Data of Recipe code 71		
44033～44048	Data of Recipe code 72		

⬇ 8.4. 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

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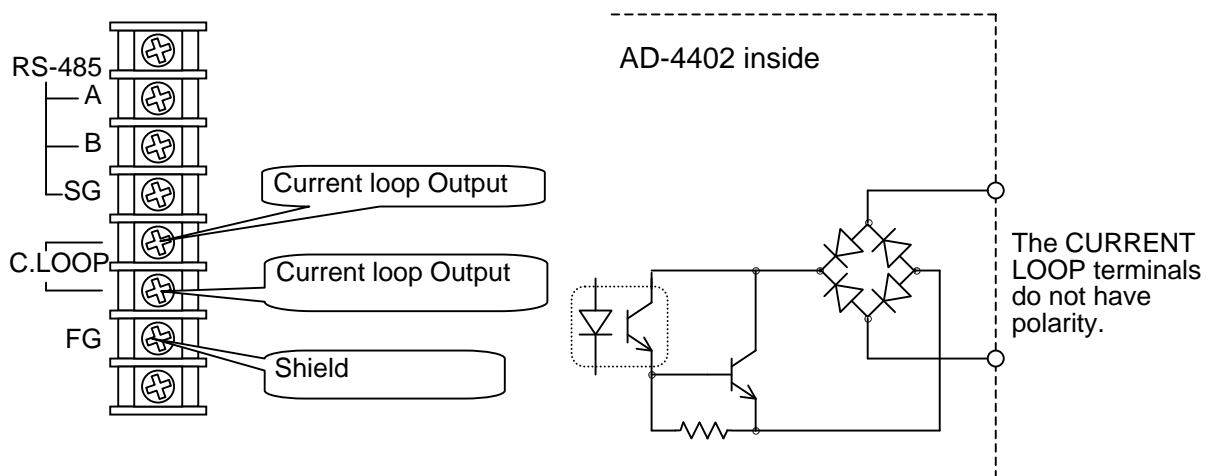
The current loop output has no polarity.
Use an external DC current source.
Connect the FG terminal when using a shielded cable.

8.4.2. Communication Modes

❑ There are the following modes.

Stream Mode
> The data is output at every display update. If the data cannot 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 data or canceling the last result, the results of batch finish and recipe finish are printed. When canceling the last result, the inverse polarity data is output.

8.4.3.　Data Format

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

8.4.4.　Recipe Printing

Recipe printing is a function to output the results of weighing performed using the simple recipe function to an external printer.
Use a printer in dump print mode.
Set "Communication mode" to "Auto print mode" (CLF-02=2).

Recipe printing mode

Recipe printing has three modes depending on the printer. A mode is selected in the function setting.

CLF-07 (Process print of recipe)

Parameter		Description
0	-	No recipe printing
1	Mode 1	For general-purpose printers and A&D 24-digit printers such as AD-8118A/B The material code is printed in two lines. The material name of 12 characters is fully printed. The maximum number of printing characters per line is 22, with $^C_R{}^L_F$ at the end of the line.
2	Mode 2	Exclusively for A&D 24-digit printers such as AD-8118A/B To save printing paper, the material code is printed in one line. Consequently, the material name is printed using only the first nine characters.
3	Mode 3	For A&D 16-digit printers usch as AD-8121

Mode 1

```
Recipe 35 SpecialBlendᶜₐᴸF
MCode 01 BlueMountain ᶜₐᴸF
          1234.567 kgᶜₐᴸF
MCode 02 Kona         ᶜₐᴸF
          1234.567 kgᶜₐᴸF
MCode 03 Columbia     ᶜₐᴸF
          1234.567 kgᶜₐᴸF
MCode 05 Brazil       ᶜₐᴸF
          1234.567 kgᶜₐᴸF
MCode 06 ABCDEFGHIJKL ᶜₐᴸF
          1234.567 kgᶜₐᴸF
 Total    123456.789 kgᶜₐᴸF
ᶜₐᴸF
```

Mode 2

```
R35 Special BlendᶜₐᴸF
M01 BlueMount 123.456 kg
M02 Kona      123.456 kg
M03 Columbia  123.456 kg
M04 Brazil    123.456 kg
M05 ABCDEFGHI 123.456 kg
M06 ABCDEFGHI 123.456 kg
   Total   123456.789 kg
ᶜₐᴸF
```

Mode 3

```
R35 SpecialBlend
M01   1234.567 kg
M02   1234.567 kg
M03   1234.567 kg
M04   1234.567 kg
M05   1234.567 kg
M06   1234.567 kg
Tot123456.789 kg
ᶜₐᴸF
```

$^C_R{}^L_F$ (0D, 0A) indicates carriage return and is not to be printed.
After the total, a blank line is inserted.

Total is a total weight of the materials used in the current recipe, not the total weight saved per recipe code.

Printing the date and time

When a printer with the data and time printing function such as AD-8118A/B or AD-8121 is used for recipe printing, the data and time can be added to the printout. These printers will print the date when ^E_CD (1B, 44) is received, and the time when ^E_CT (1B, 54) is received.

For the date and time printing format, refer to each printer instruction manual.

The printing position of the date and time can be specified to be before the recipe printing or after the recipe printing in the function setting.

CLF-08 (Print for data & time)

Parameter	Description
0	Do not print date and time.
1	Print the date before the recipe printing.
2	Print the time before the recipe printing.
3	Print the date and time before the recipe printing.
4	Print the date after the recipe printing.
5	Print the time after the recipe printing.
6	Print the date and time after the recipe printing.

When printing, ^E_CD is replacde with the date, ^E_CT is replaced with the time.

Mode 1　　**Mode 2**　　**Mode 3**

```
01/02/03 10:20 AM        C L
                         R F
Recipe 35 SpecialBlend C L
                       R F
MCode 01 BlueMountain  C L
                       R F
         1234.567 kg C L
                     R F
MCode 02 Hawaii Kona   C L
                       R F
         1234.567 kg C L
                     R F
```

```
01/02/03 10:20 AM   C L
                    R F
R35 SpecialBlend C L
                 R F
M01 BlueMount 123.456 kg
M02 ABCDEFGHI 123.456 kg
```

```
DATE   01/02/03
10:20:32 AM
R35 SpecialBlend
M01   1234.567 kg
M02   1234.567 kg
```

Above:
Example of printing date and time before recipe printing

Below:
Example of printing date and time after recipe printing

```
MCode 10 ABCDEFGHIJKL C L
                      R F
          1234.567 kg C L
                      R F
C L
R F
 Total    123456.789 kg C L
                        R F
01/02/03 10:20 AM        C L
                         R F
C L
R F
```

```
M09 ABCDEFGHI 123.456 kg
M10 ABCDEFGHI 123.456 kg
     Total   123456.789 kg
01/02/03 10:20 AM        C L
                         R F
C L
R F
```
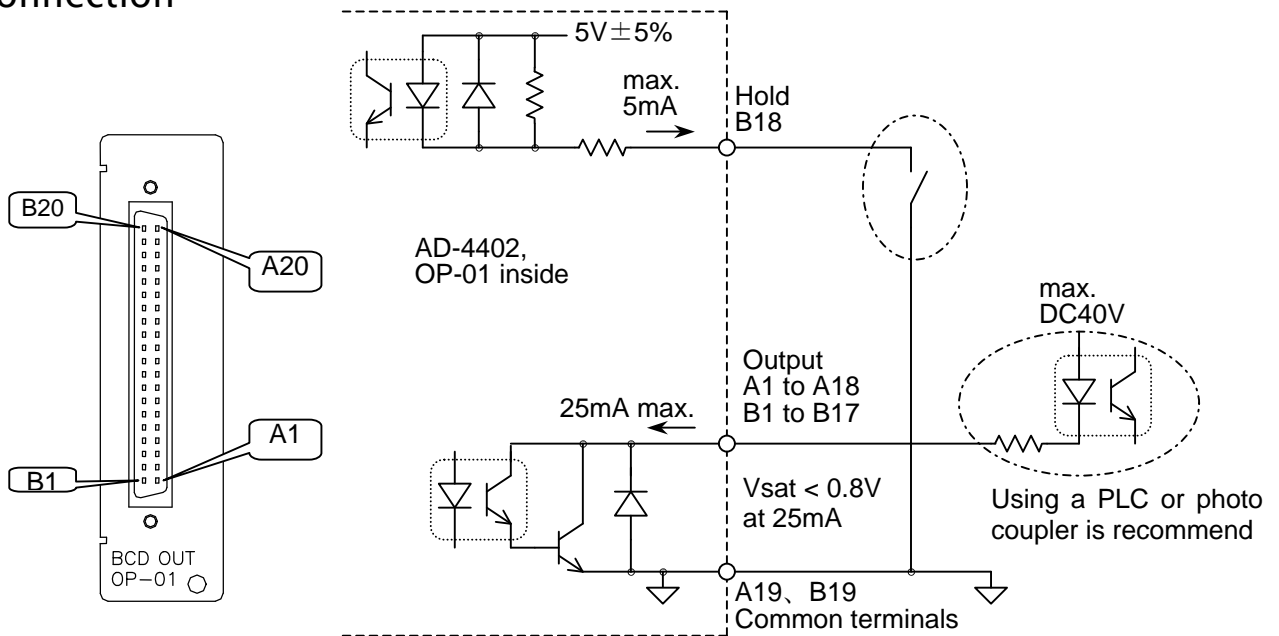
```
M09   1234.567 kg
M10   1234.567 kg
Tot123456.789 kg
DATE   01/02/03
10:20:32 AM
C L
R F
```

▼ 8.5. 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 ±5%
Input current	5 mA max.
Threshold voltage	1.5 V max.

Connection

AD-4402, OP-01 inside

5V±5%

max. 5mA

Hold B18

max. DC40V

Output A1 to A18 B1 to B17

25mA max.

Vsat < 0.8V at 25mA

Using a PLC or photo coupler is recommend

A19、B19 Common terminals

B20 A20 A1 B1

BCD OUT OP−01

Terminals

When weighing display, gross display, net display or tare display [$O IF - I$] [$I, 2, 3, 4$] 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 [$O IF - I$] [$5, 6, 7, 8$] 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 [$0 IF - 1$] [9] are used, the function of the terminals are as follows:

A1	Material code at	1	B1	Material code at	2
A2	weighing	4	B2	weighing sequence	8
A3	sequence	10	B3		20
A4		40	B4		80
A5	Referred	1	B5	Referred material code	2
A6	material code	4	B6		8
A7		10	B7		20
A8		40	B8		80
A9	Recipe code at	1	B9	Recipe code at	2
A10	weighing	4	B10	weighing sequence	8
A11	sequence	10	B11		20
A12		40	B12		80
A13	Referred recipe	1	B13	Referred recipe code	2
A14	code	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 [$0 IF - 1$] [10] are used, the function of the terminals are as follows:

A1	Sequence error	1	B1	Sequence error	2
A2	number	4	B2	number	8
A3		Error	B3		
A4			B4		
A5	Zero error	1	B5	Zero error number	2
A6	number	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	

AD–4402

Communication Modes

❑ There are the following modes.

Stream Mode

The data is output at every display update. If the data cannot 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 data or canceling the last result, the results of batch finish and recipe finish are printed. When canceling the last result, 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.
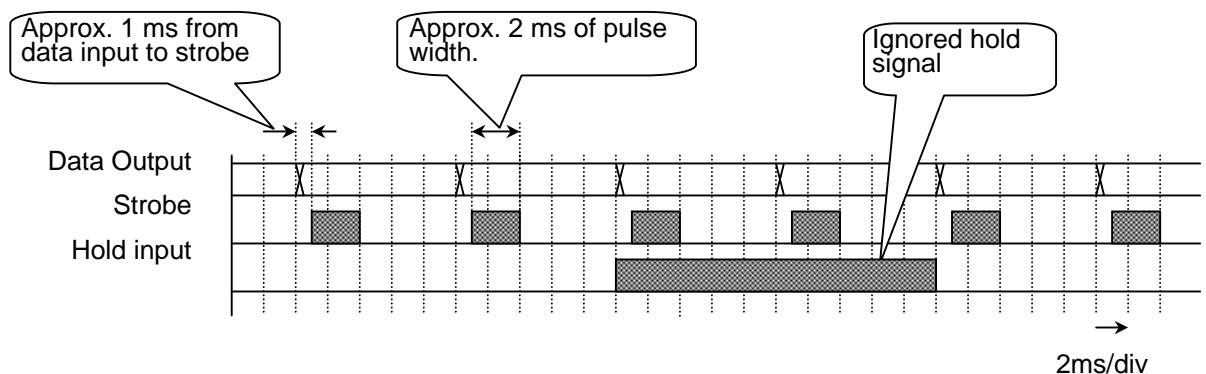Set baud rate to 38400 bps.
When slow baud rate is $1/2^n$ times 38400 bps, the same data is output 2^n times

Timing Chart

When **normal output** [$0 IF - 3$] $\neq 5$ is used

Approx. 10 ms from data input to strobe

Approx. 20 ms of pulse width.

50 ms of delay time to hold it.

50 ms of delay time to release it

Data Output
Strobe
Hold input

10ms/div
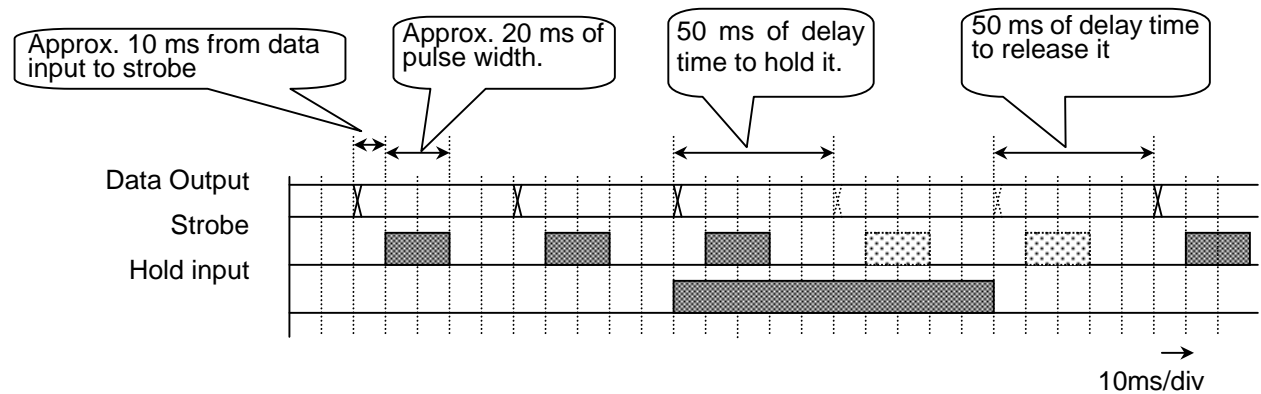
When **jet steam mode** output [$0 IF - 3$] $= 5$ is used

Approx. 1 ms from data input to strobe

Approx. 2 ms of pulse width.

Ignored hold signal

Data Output
Strobe
Hold input

2ms/div

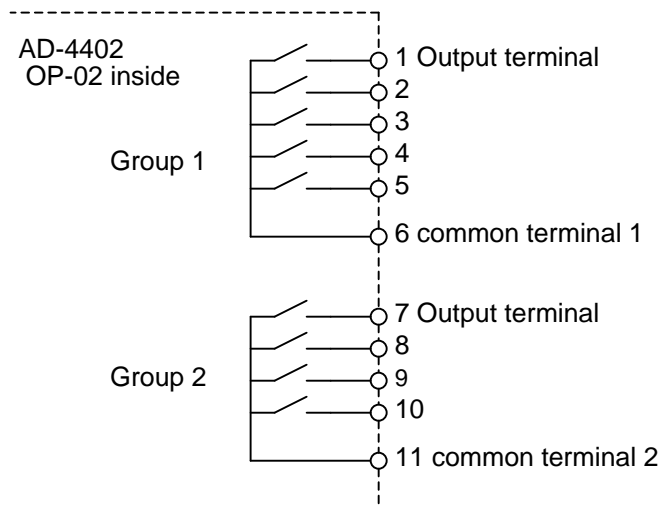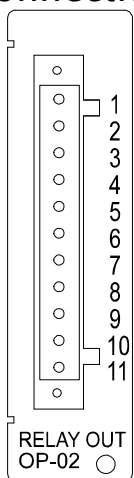# ⏬ 8.6. Relay Output of Option OP–02

Rated load   250 VAC, 3 A
                                            30 VDC, 3 A

Current at common terminal   Max. 10 A DC

Minimum load   100 mV   100 μA

Life   20,000,000 times or more at no load
                                         100,000   times or more at rated load

Connection

AD-4402
 OP-02 inside

1 Output terminal
2
3
Group 1
4
5
6 common terminal 1

7 Output terminal
8
Group 2
9
10
11 common terminal 2

RELAY OUT
OP-02 ○

Terminal List
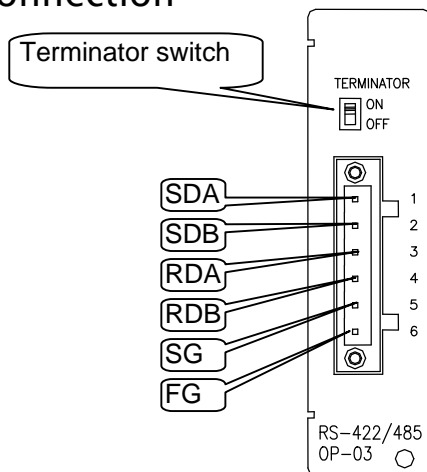   Refer to "10.5. Parameter List" of the function list.

❑ 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.

❑ Up to a maximum of 32 units using this interface can be connected to 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.

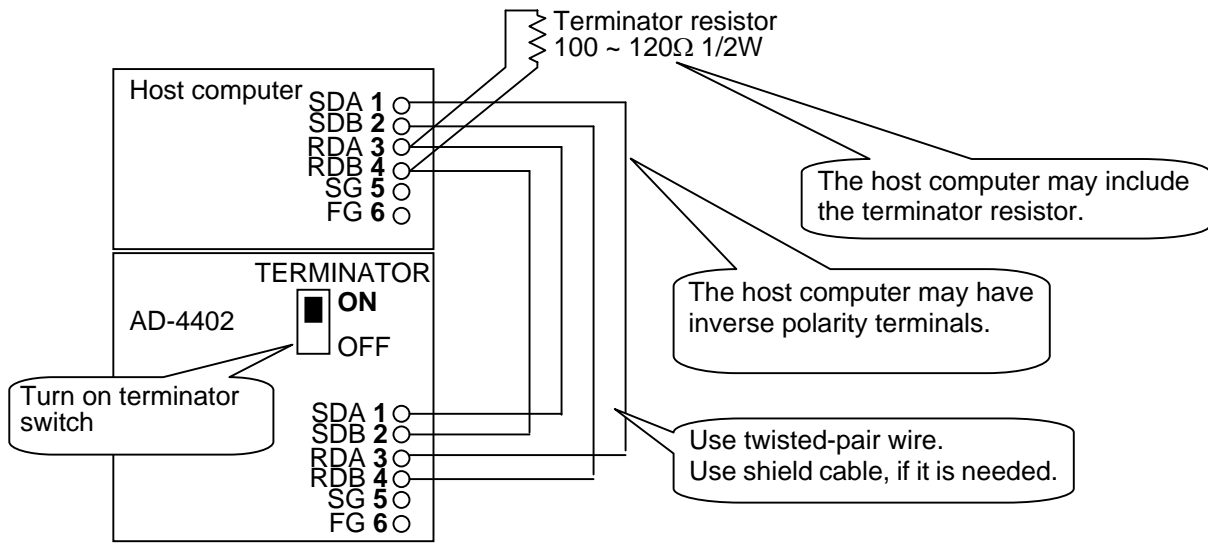|	
Transmission system	EIA RS-422 / 485, Asynchronous, bi-directional, half-duplex
Data length	7 bits or 8 bits
Start bit	1 bit
Parity bit	Odd, Even, not used
Stop bits	1 bit, 2 bits
Baud rate	600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps(Jet stream mode)
Line	RS-422: 4 wires 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
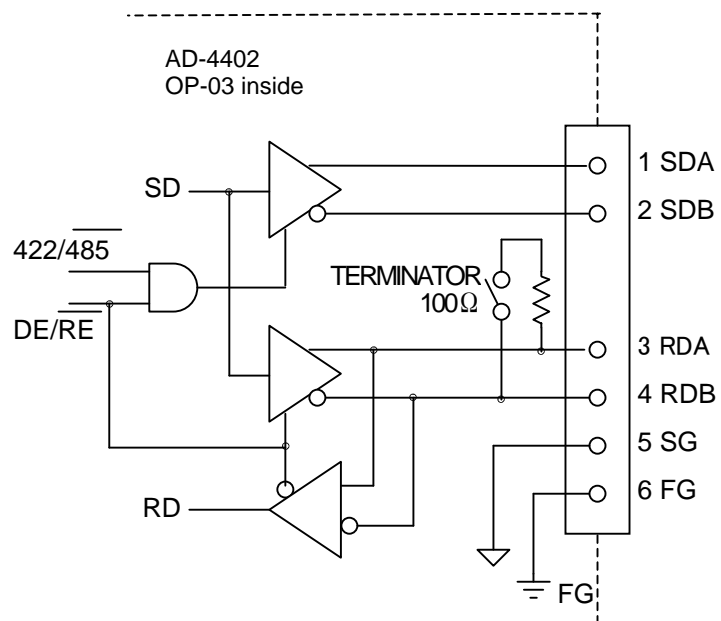
RS-422 Connections

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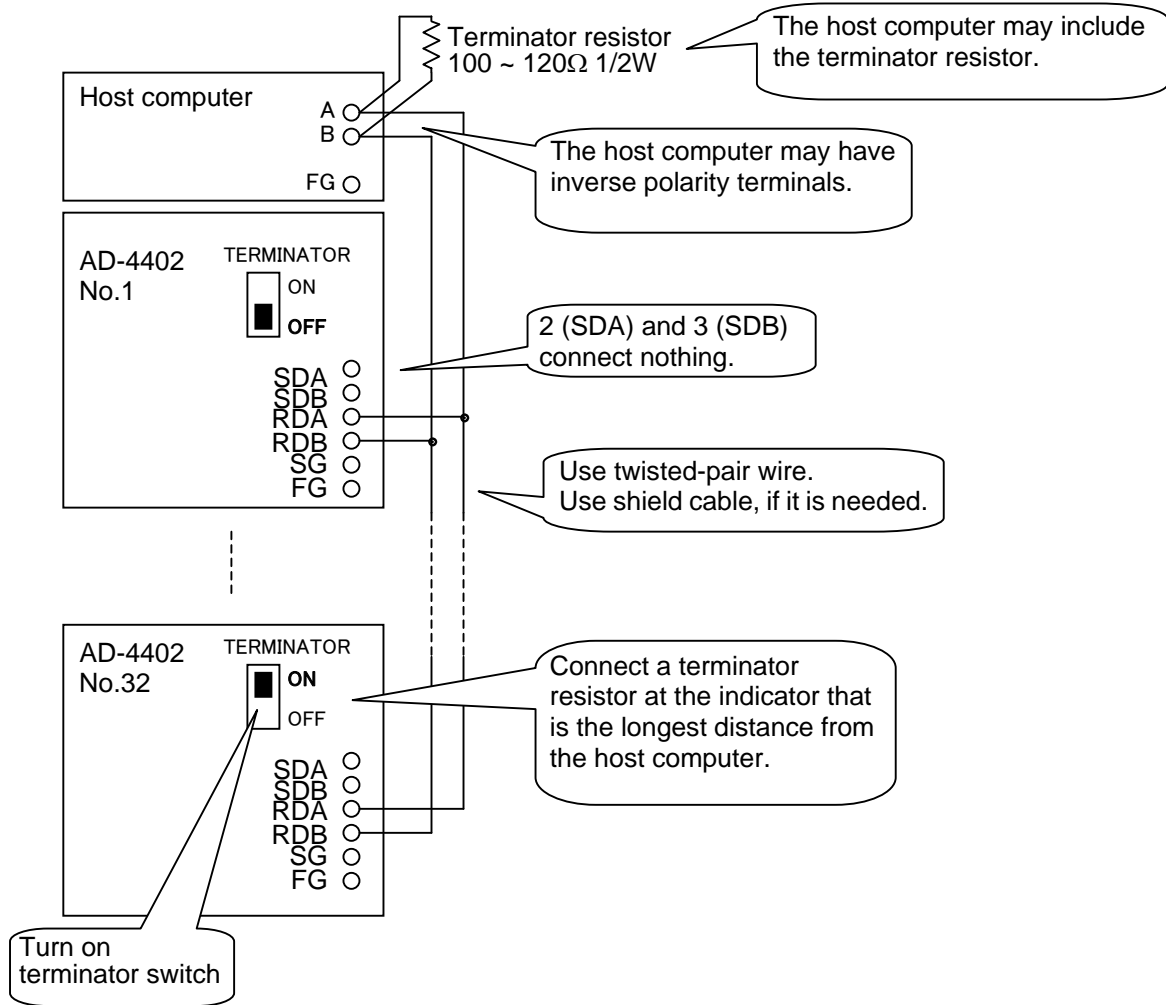
            Address Number 0   [03 F-8] [0].

Host computer
SDA **1**
SDB **2**
RDA **3**
RDB **4**
SG **5**
FG **6**

Terminator resistor
100 ~ 120Ω 1/2W

The host computer may include the terminator resistor.

The host computer may have inverse polarity terminals.

AD-4402

TERMINATOR
■ **ON**
OFF

Turn on terminator switch

SDA **1**
SDB **2**
RDA **3**
RDB **4**
SG **5**
FG **6**

Use twisted-pair wire.
Use shield cable, if it is needed.

RS-485 4 Wire Connections

Settings   RS-422   [03 F-11] [1]

            Address Number   [03 F-8] [without 0].

Terminator resistor
100 ~ 120Ω 1/2W

The host computer may include the terminator resistor.

Host computer
SDA
SDB
RDA
RDB
SG
FG

The host computer may have inverse polarity terminals.

Use twisted-pair wire.
Use shield cable, if it is needed.

AD-4402
No.1

TERMINATOR
ON
■ **OFF**

SDA
SDB
RDA
RDB
SG
FG

AD-4402
No.32

TERMINATOR
■ **ON**
OFF

Connect a terminator resistor at the indicator that is the longest distance from the host computer.

SDA
SDB
RDA
RDB
SG
FG

RS–485 2 Wire Connections

Settings   RS-485   [03 F-11] [2]

Terminator resistor
100 ~ 120Ω 1/2W

The host computer may include the terminator resistor.

Host computer

A
B

FG

The host computer may have inverse polarity terminals.

AD-4402
No.1

TERMINATOR
ON
OFF

SDA
SDB
RDA
RDB
SG
FG

2 (SDA) and 3 (SDB) connect nothing.

Use twisted-pair wire.
Use shield cable, if it is needed.

AD-4402
No.32

TERMINATOR
ON
OFF

SDA
SDB
RDA
RDB
SG
FG

Connect a terminator resistor at the indicator that is the longest distance from the host computer.

Turn on terminator switch

Settings of Parameters

Refer to "10.5. 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 receiveing the next command
- Hi-Z: Hi impedance

Waiting time from command to response: tr. Set tr at [03 F- 9].

Waiting time until next command: td > 4 ms

Waiting time from command to response: tr. Set tr at [03 F- 9].

Host computer

Hi-Z   @01RW$^C_R{}^L_F$ Hi-Z   @02RW$^C_R{}^L_F$ Hi-Z

AD-4402
Address 1

Hi-Z   @01ST,NT,+0123.45kg$^C_R{}^L_F$ Hi-Z

AD-4402
Address 2

Hi-Z   @02ST,NT,+0123.45kg$^C_R{}^L_F$
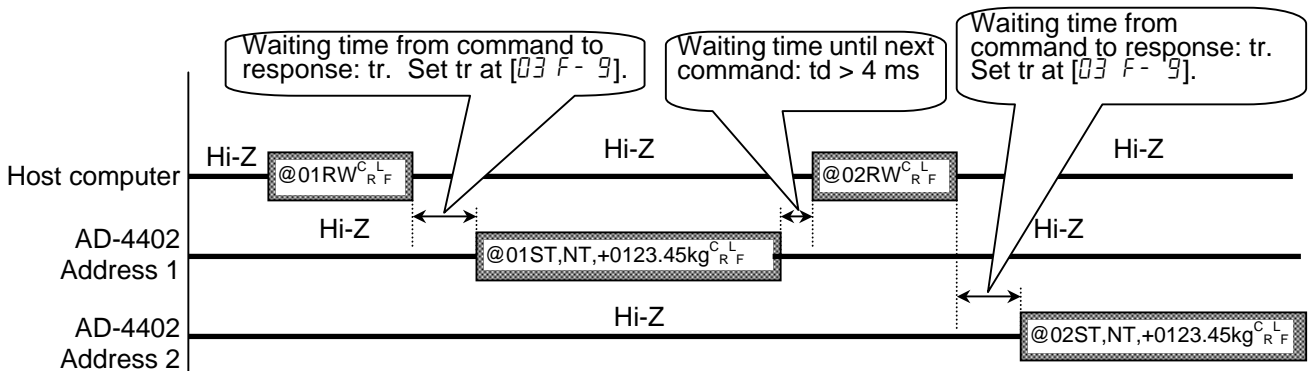
▼ 8.8. RS-232C Interface of Option OP-04

- ❑ The RS-232C interface is used to connect to a 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
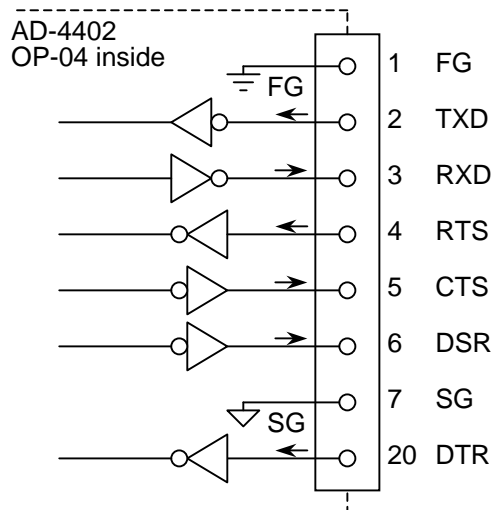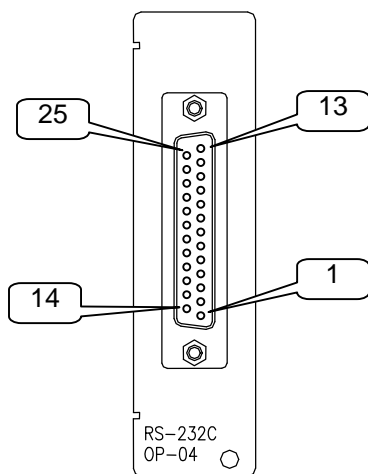
Settings of Parameters
Refer to "10.5. Parameter List" of the function list.

8.9. 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
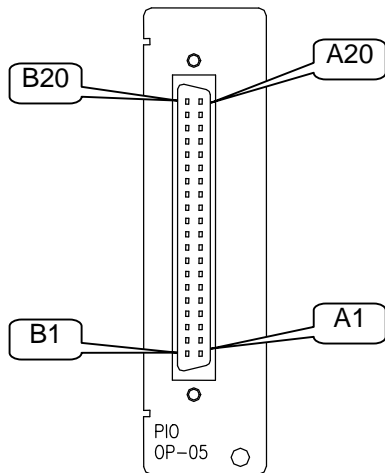
A1 ~ A16	Input terminals
A17	
A18	Input common
A19	
A20	Frame ground
B1 ~ B16	Output terminals
B17	
B18	Output common
B19	
B20	Frame ground

Terminal List
Refer to "10.5. Parameter List" of the function list.

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

⚟ 8.10. Analog Output of Option OP-07

❑ This option outputs a DC current that is proportional 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 rate	100 times per second with the Sampling frequncy divider [*GEnF- 3*]
Zero temperature coefficient	±150 ppm/℃ max.
Span temperature coefficient	±150 ppm/℃ max.
Non- linearity	0.1% max.
Resolution	Smaller value of either 1/40000 or resolution of display

Connection
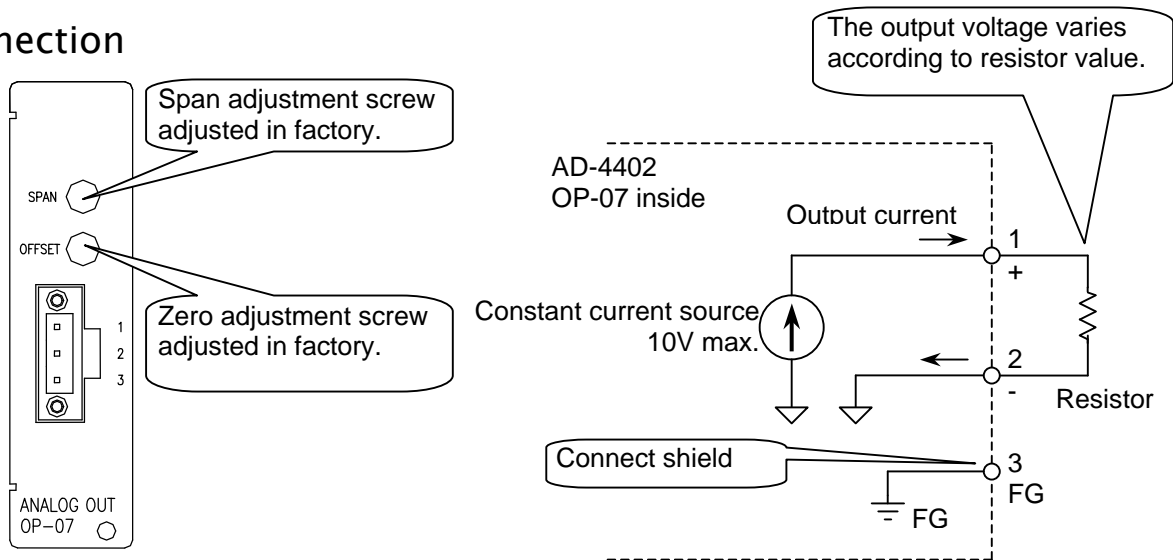
Settings of Parameters
Refer to "10.5. Parameter List" of the function list.
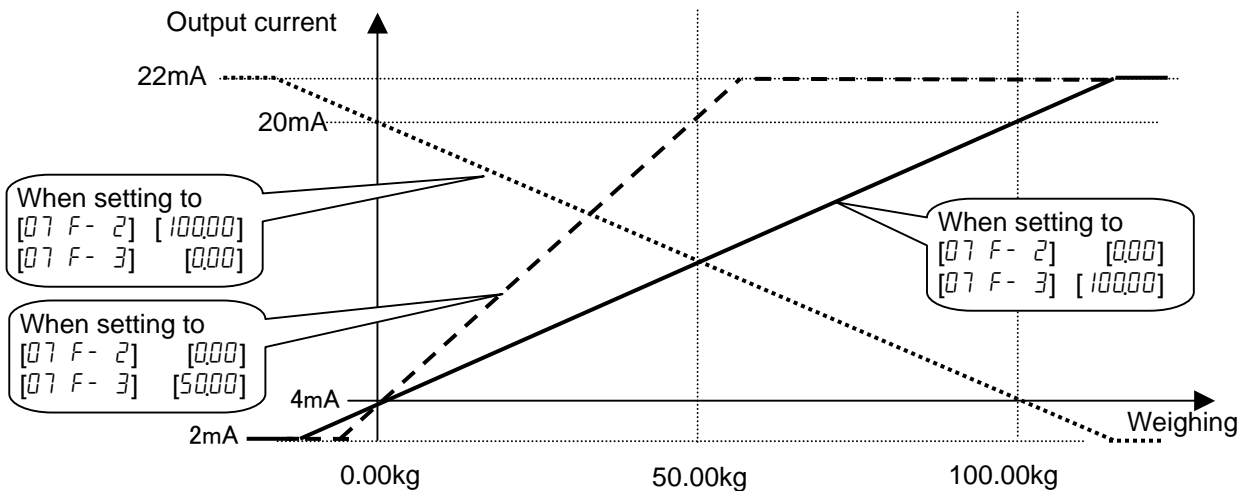
⬇ 9.   Maintenance

⬇ 9.1. Basic Operation

To enter the maintenance function   Press and hold the **ENTER** key and press the ⬇ key in the weighing mode.
Select the menu `maintenance` using the ⬇ key and the **ENTER** key.

To select an address of the parameter   The ⬇, **SHIFT** + ⬇, **ENTER**, **ESC** keys.

To change the parameter   The ⬇, **SHIFT** + ⬇, **Alphanumerical**, **ENTER**, **ESC** keys.

To exit the mode   The **ESC** key.
(To return to the weighing mode)

⬇ 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

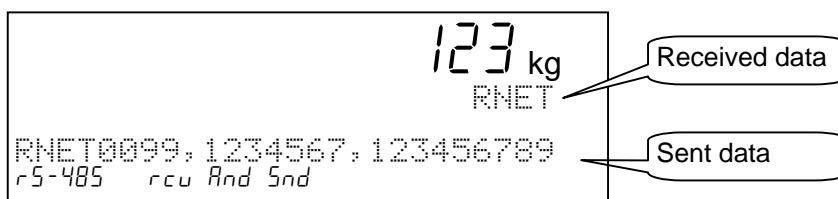❑   Used to monitor the status of the I/O terminals.

When [`GEnF- 1`] is slow, it may not display all data.

```
                        123 kg
CONTROL    00010001000
           A11         A1        Input terminal A1
   I/O        00110100001
           b11         b1        Output terminal B1
```
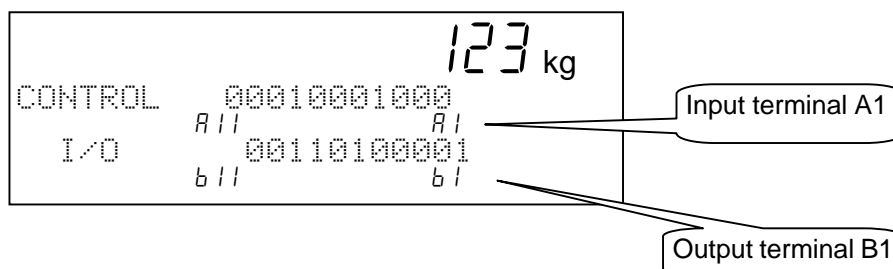
9.2.2.   Monitoring the Built–in RS–485 Interface

❑   The current communication data is displayed.

Parity: `P`
Framing: `F`

```
                        123 kg
                        RNET            Received data
RNET0099,1234567,123456789             Sent data
rS-485   rcu And Snd
```
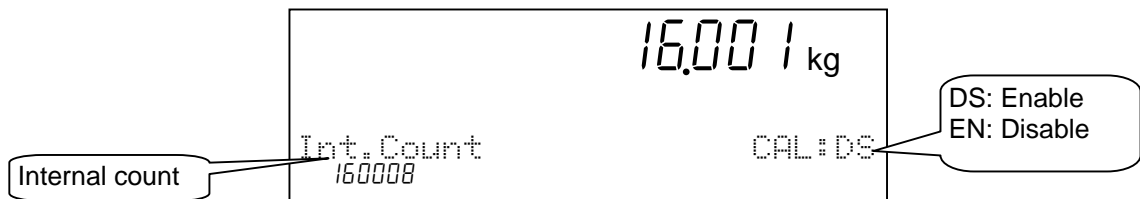
9.2.3.   Monitoring the Built-in Current Loop Output

❑ The current communication data is displayed.

Parity: P
Framing: F

```
                      123 kg
                      RNET         ← Received data

             ST,NT,+012.345kg      ← Sent data
CurrEnt LooP    Snd
```
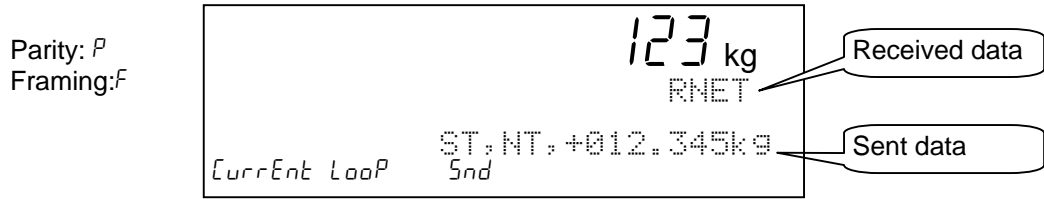
9.2.4.   Monitoring the A/D Converter

❑ The current A/D converter data is displayed.

```
                      16.001 kg

                                   DS: Enable
                                   EN: Disable
Int.Count               CAL:DS
Internal count →  160008
```

9.2.5.   Monitoring the BCD Output of OP-01

❑ The current BCD output data is displayed.

```
A18                   12345 kg      A1
OP-01    001111000100011011
         A18                 A1     B1
         001001000001010000
B18      b18                 b1
```
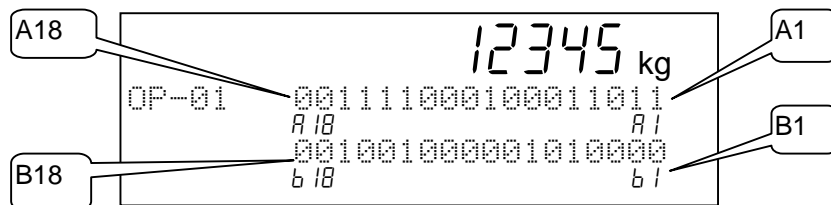
9.2.6.   Monitoring the Relay Output of OP-02

❑ The status of the current relay outputs is displayed.

Output terminal 7 ~ 10

```
                      123 kg       Output terminal 1 ~ 5

OP-02          0001    10100
               10   7   5    1
```

When [GEnF-1] is slow, it may not display all data.
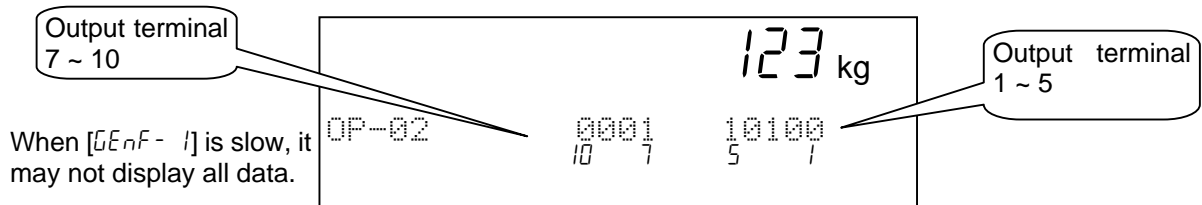
9.2.7. Monitoring the RS–422/485 Interface of OP–03

❑ The current communication data is displayed.

Parity: P
Framing: F

123 kg
RNET

Received data

RNET0099,1234567,123456789
OP-03   rcu And Snd

Sent data
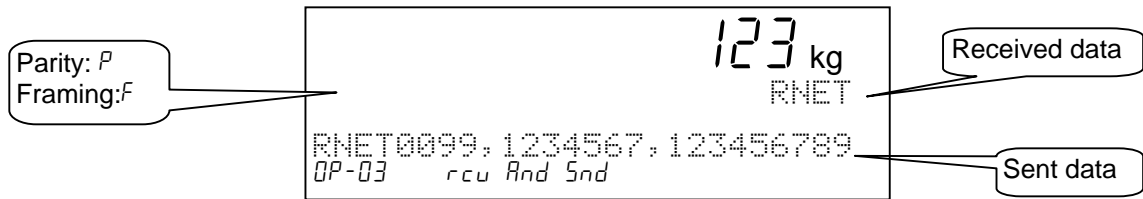
9.2.8. Monitoring the RS–232C Interface of OP–04

❑ The current communication data is displayed.

Parity: P
Framing: F

123 kg
RNET

Received data

RNET0099,1234567,123456789
OP-04   rcu And Snd

Sent data
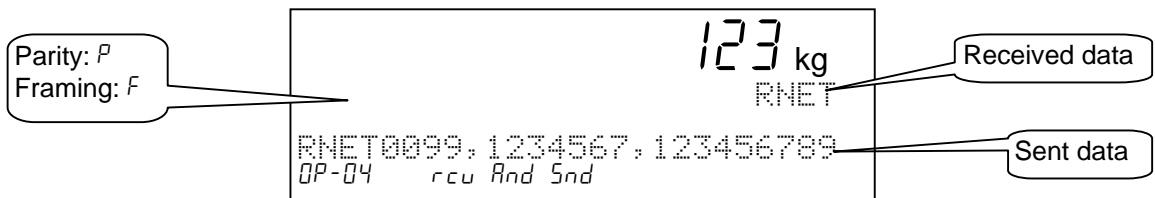
9.2.9. Monitoring the Parallel I/O of OP–05

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

123 kg

OP-05   100100001000 1000
A 16   A 1

Input terminal A1

When [GEnF- 1] is slow, it may not display all data.

0101100110100001
b 16   b 1

Output terminal B1
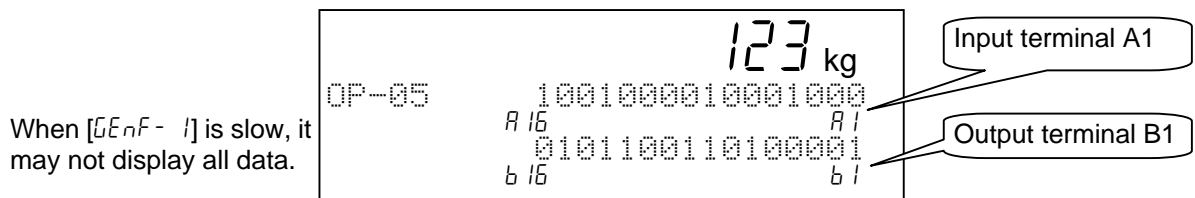
9.2.10. Monitoring the Analog Output of OP–07

❑ The current communication data is displayed.

96.27 kg

OP-07

Analog output

19.403 mA
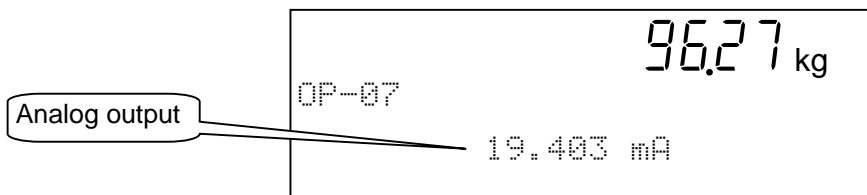
⬇ 9.3. Test Mode

- 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.**
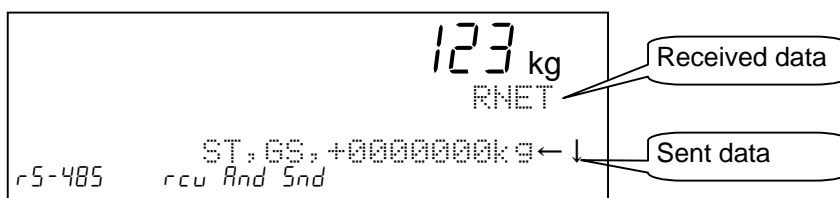
9.3.1.   Testing the Control I/O Function

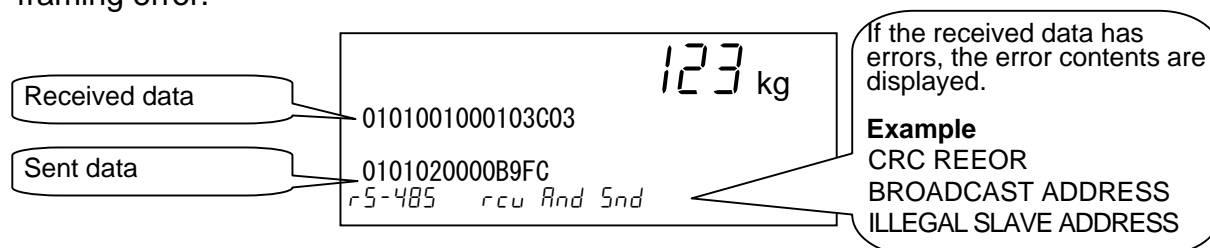- Tests the output of the I/O terminals. An active output of level "1" shifts for each terminal.

Input terminal A1

Output terminal B1
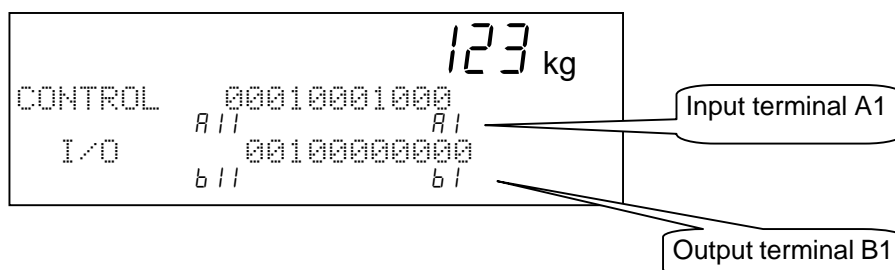
9.3.2.   Testing the Built-in RS-485 Interface

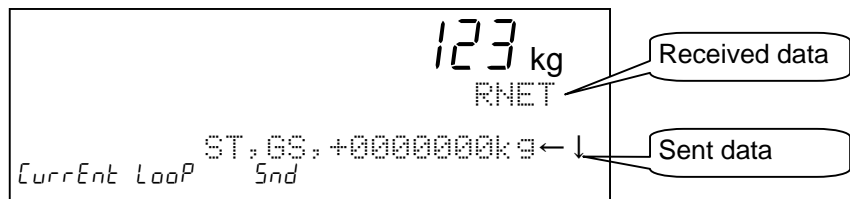- When pressing the **ENTER** key each time, the test data "ST,GS,+0000000kg CR LF" is output.

Received data

Sent data

9.3.3.   Testing the Modbus Interface

- Use the same monitor display as the RS-485 interface, to confirm a parity error or framing error.

Received data

Sent data

If the received data has errors, the error contents are displayed.

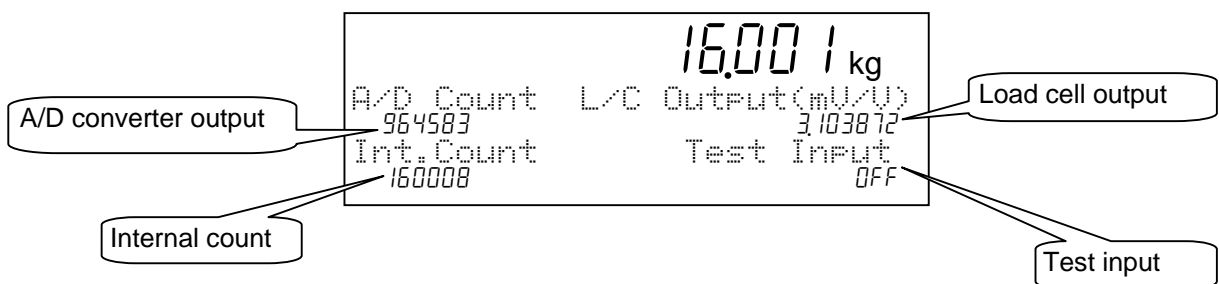**Example**
CRC REEOR
BROADCAST ADDRESS
ILLEGAL SLAVE ADDRESS

9.3.4. Testing the Built-in Current Loop Output

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

```
                        123 kg          ┌─ Received data
                        RNET            └─

                ST,GS,+0000000kg←┘       ┌─ Sent data
CurrEnt LooP    Snd                     └─
```
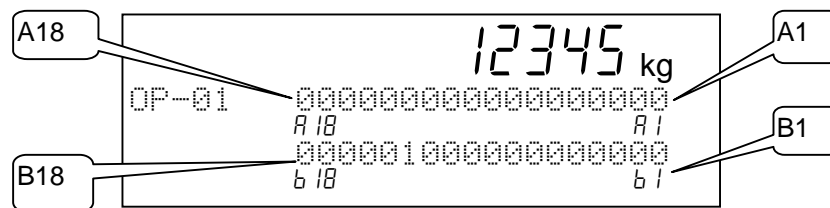
9.3.5. Testing the A/D Converter

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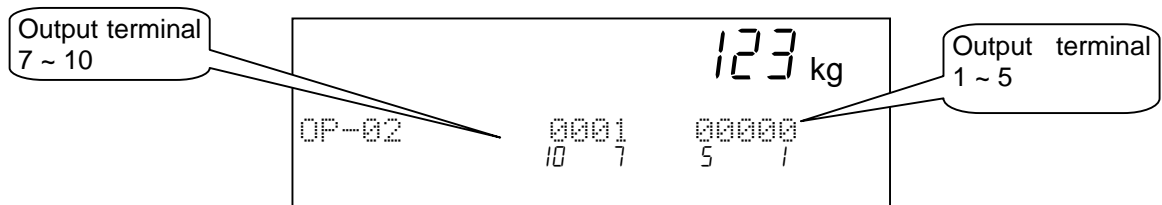❑ When pressing the **ENTER** key, a test voltage can be input to the A/D converter.

```
                        16.001 kg       ┌─ Load cell output
A/D converter output ─  A/D Count   L/C Output(mV/V)
                        964583              3103872
Internal count ─────    Int.Count       Test Input
                        160008               OFF    ─ Test input
```

9.3.6. Testing the BCD Output of OP-01

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

```
A18                      12345 kg            A1
        OP-01    000000000000000000
                 A18                  A1     B1
                 000001000000000000
B18              b18                  b1
```

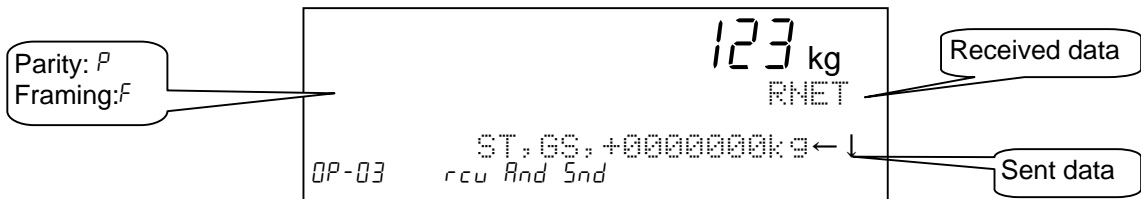## 9.3.7. Testing the Relay Output of OP-02

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

```
Output terminal                              Output terminal
7 ~ 10                   123 kg               1 ~ 5

OP-02            0001      00000
                 10   7    5    1
```

9.3.8.　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.

Parity: P
Framing: F

123 kg
RNET
ST,GS,+0000000kg←↲
OP-03   rcu And Snd

Received data

Sent data

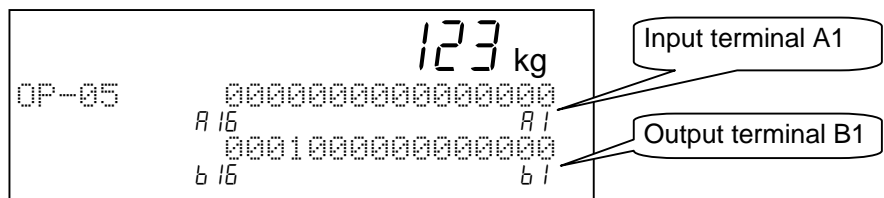## 9.3.9.　Testing the RS-232C Interface of OP-04

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

Parity: P
Framing: F

123 kg
RNET
ST,GS,+0000000kg←↲
OP-04   rcu And Snd

Received data

Sent data
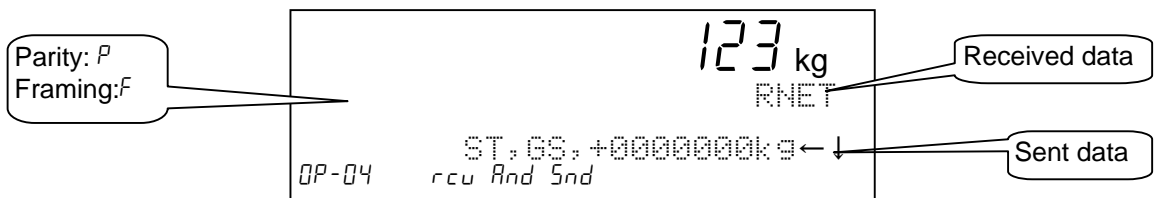
9.3.10.　Testing the Parallel I/O of OP-05

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

123 kg
OP-05   0000000000000000
         A16   A1
         0001000000000000
         b16   b1

Input terminal A1

Output terminal B1

9.3.11.　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.

96.27 kg
OP-07

Analog output

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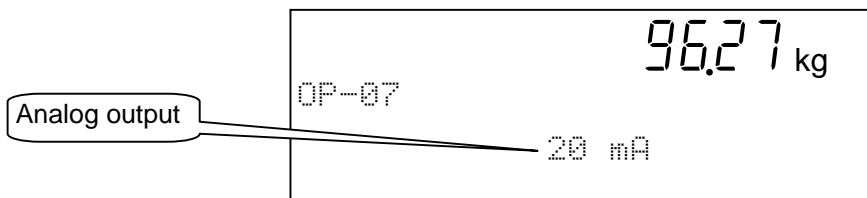
- This function initializes the parameters stored in the indicator.
- The parameters are stored in the flash memory and backup RAM.

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 calibration 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.

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	o	o	o	o	o	o		
	Flash memory			o		o		o	o
Initialization mode	Initializing RAM	o	o						
	Initializing material code or recipe code			o	o	o	o		
	Initializing the function list							o	
	Initializing calibration data								o
	Initializing all parameters	o	o	o	o	o	o	o	o

Procedure
Caution
- **Do not initialize the parameters while in operation. Turn 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 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.

Advice

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 memory even if power is removed.
- ❑ An item is classified by a category address, and is further classified by an item number.
  Refer to "10.2. Outline of the Function List".
- ❑ The category address has a symbol for the 7-segments display
- ❑ There are two 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 to the parameter in the weighing sequence.

Example of an item:
Category address: [Function] - [Function setting] - [General] - [Weighing]
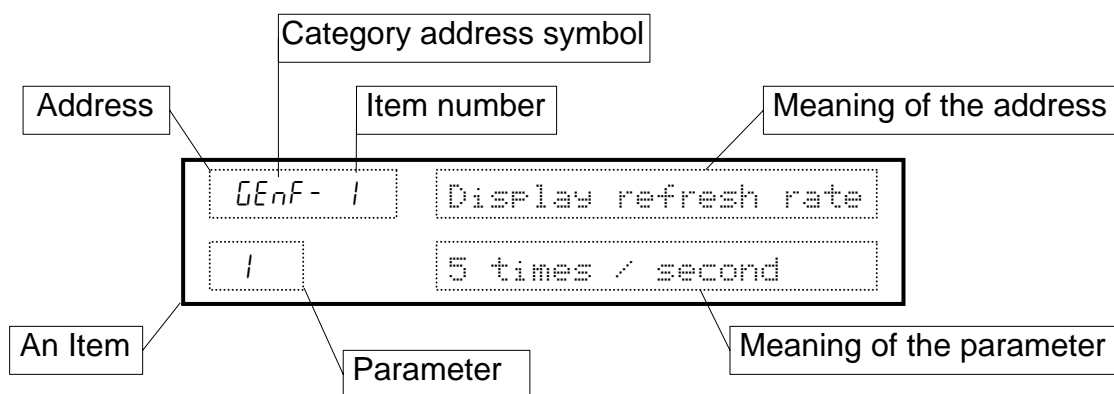
Caution
- ❑ **When entering** `Parameter settings` **of the function mode, the current weighing sequence is stopped.**

⬇ 10.1. Operation Keys

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

10.2. Outline of the Function List

Category Address	Start Item
`Function`	
`Function reference`	
`General`	
`Weight`	`GEnF- 1`
`Sub display`	`Sub F 1`
`Other`	`othF- 1`
`Sequence`	
`Basic`	`S9 F- 1`
`Control`	`S9 F-11`
`Timer`	`S9 F-31`
`Setpoint` (Comparison value)	`S9 F-51`
`Total` (Accumulation)	`S9 F-61`
`Safety`	`S9 F-71`
`Control I/O`	
`Input`	`In F- 1`
`Output`	`OutF- 1`
`Serial interface`	
`Current Loop`	`CL F- 1`
`RS-485`	`rS 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`

▼ 10.3. 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]

[*59 F-3 1*] to [*59 F-48*]
                Weighing sequence timers
                [Function] - [Function setting] - [Sequence] - [Timer]

▼ 10.4. 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.

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

Category address symbol	Name	Descriptions	Range and choices	Default
ᶦᴱₙF- ᴵ	Display refresh rate	1: 5 times / second 2: 10 times / second 3: 20 times / second	1 to 3	2
ᶦᴱₙF- ᴿ	Digital filter	0: Not used Select 3dB band for two 1: 11 Hz low pass filters. 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 A/D converter ↓ First filter ↓ Second filter	0 to 99	4 8
ᶦᴱₙF- ᴲ	Sampling frequency divider	Use to decrease the cut-off frequency of the digital filter.	0 to 10	1
ᶦᴱₙF- ᵞ	Stability detection time	The detection condition concerning stability.	0.0 to 9.9 **s**	1.0 **s**
ᶦᴱₙF- ᴽ	Stability detection band width	0.0 : stable at anytime.	0.0 to 9.9 **d**	2.0 **d**
ᶦᴱₙF- ᴳ	Zero Range	The range to zero the gross display. Center of range is zero calibration. Unit: percentage of weighing capacity.	0 to 30 %	5 %
ᶦᴱₙF- ᴵ	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**
ᶦᴱₙF- ᴮ	Zero tracking band width		0.0 to 9.9 **d**	0.0 **d**
ᶦᴱₙF- ᴳ	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
ᶦᴱₙF- ᴵᴼ	Tare at negative GROSS weight	When negative weighing, whether tare command is used. 0 :Prohibit tare. 1 :Permission to tare.	0 to 1	1
ᶦᴱₙF- ᴵᴵ	Preset tare	Preset tare of material code 0 :Not used 1 :Used	0 to 1	1

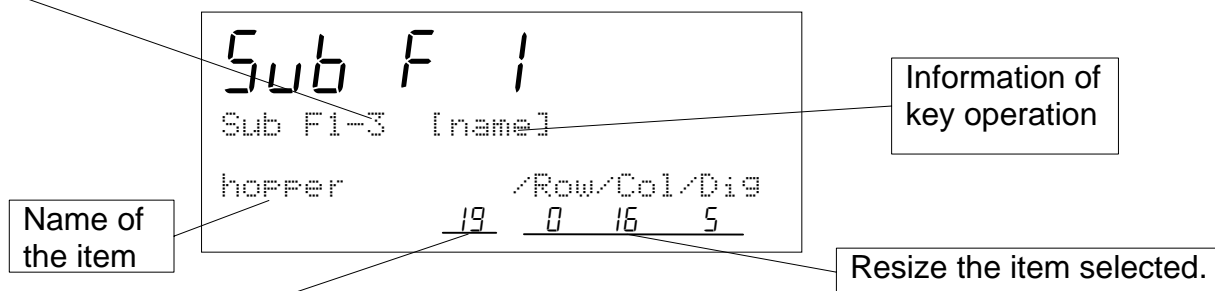| Category address symbol	Name	Descriptions	Range and choices	Default
GEnF - 12	Preset tare =0 choice	1: If tare value of material code is zero, the last tare value is used. 2: If tare value of material code is zero, Tare is set to zero.	1 to 2	1
GEnF - 13	Clear mode at power ON	The action at turning the indicator on. First bit:　　Zero Second bit: Zero clear Third bit:　　Tare Fourth bit:　Tare clear 0:　Not used 1:　Used	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 alphanumerical characters.
Even: Input the number concerning the item.

Sub F 1

Sub F1-3 [name]

hopper   /Row/Col/Dig
          19   0   16   5

Information of key operation

Name of the item

Resize the item selected.

Number	Name and Number to Display the Item	Row size	Columsize	Figures
0	Not displayed	0 to 3	0 to26	1 to12
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			
24	Recipe process			

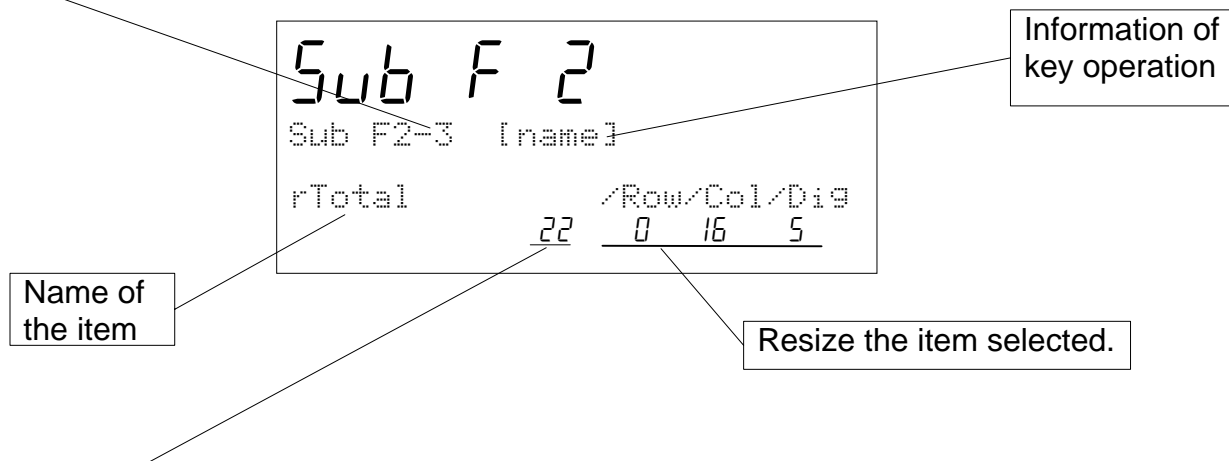Category address: [Function] – [Function setting] – [General] – [Sub-display]

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] [l]), 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 alphanumerical characters.
Even: Input the number concerning the item.

Sub F 2

Sub F2-3 [name]

Information of key operation

rTotal   /Row/Col/Dig
              22   0   16   5

Name of the item

Resize the item selected.

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

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.	1 to 2	1
5ub F 5	Activity indicator	0: Off (Not used) 1: On (Used)	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 7: Recipe start	0 to 27	0
othF- 3	F2 key function	8: Discharge 9: Mixing 10: Pause 11: Internal reseved 12: Restart 13: Forced batch finish 14: Forced recipe finish 15: Forced discharge finish		
othF- 4	F3 key function	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. 21: Clear the total weight and count for each recipe code.		
othF- 5	F4 key function	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. 25: Set final value 26: Set free fall 27: Set preliminary		
othF- 6	Parallel I/O Buzzer	Buzzer output is 2 **s**. Beep is 0.2 **s** used in Control 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 (Used: Short or Open)	0000000 000000000 to 1111111 11111111 11	10000 000000 000000 0

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 cannot 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 cannot 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 operation 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	0 to 1	1
othF- 12	Line feed	Select whether or not to perform a line feed before serial transmission. 0: No 1: Yes	0 to 1	1
othF- 13	Use comma or dot at S I/F	Select a decimal point shape used for the data in serial transmission. 1: Dot 2: Comma	1 to 2	1

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

Category address symbol	Name	Descriptions	Range and choices	Default
59 F- 1	Weighing mode	1: Customer programmed control mode 2: Built-in automatic program mode	1 to 2	2
59 F- 2	Customer programmed control logic	0: Do not reverse 1: Reverse	0 to 1	0
59 F- 3	Loss-in-weigh	0: Normal batch weighing 1: Loss-in-weigh 2: External exchange	0 to 2	0
59 F- 4	Setpoint comparison	0: Comparison with internal count 1: Comparison with display count	0 to 1	1
59 F- 5	Comparison	0: Always output 1: Stable condition 2: At batch finish	0 to 2	2
59 F- 7	Output of zero band	0: Gross <= Zero band 1: | Gross | <= Zero band	0 to 1	1
59 F- 8	Recipe mode	0: recipe sequence not used 1: Semi-automatic mode 2: Automatic mode	0 to 2	0
59 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
59 F-11	Batch start settings	Select an action at starting the weighing sequence. Bit 1: When loading it above zero band, start the sequence. Bit 2: Not used Bit 3: Automatic tare at the starting sequence 0: No (Does not work) 1: Yes (Works)	000 to 111	000
59 F-12	Nozzle control	Bit 1: Use nozzle control. "Nozzle down" operation signal is output at starting the sequence. Bit 2: Nozzle contact stop sequence Use start delay timer to prevent weighing error at touching the hopper. Bit 3: "Nozzle up" after compensate. 0: No (Not used) 1: Yes (Used)	000 to 111	000

59 F-13	Eval conditions	After dribble flow, select the stability condition of comparison. Refer to Eval delay timer [59F-37].
		0: Timer is up
		   Compare when time is up.
		1: Stable and timer is up
		   Compare when weighing is stable and the time is up.
		2: Stable or timer is up
		   Compare when weighing is stable or the time is up.
			0 to 2	1

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

Category address symbol	Name	Descriptions	Range and choices	Default
59 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 (Used)	00 to 11	00
59 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 (Used)	00 to 11	00
59 F-16	Recipe start actions	Selection of re-zeroing at recipe start. 0: No (Not used) 1: Yes (Used)	0 to 1	0
59 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 (Used)	000 to 111	000
59 F-18	Maximum number of compensation	Set the number of compensation flow. When 0 is set, there is no flow.	0 to 255	0
59 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

AD-4402

Category address symbol	Name	Descriptions	Range and choices	Default
59 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
59 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
59 F-22	Batch start time up setting	Select an action after the batch start delay timer is up 0: No action 1: Automatic batch start after tare	0 to 1	0
59 F-23	Auto free fall limit	Set the automatic free fall range to enable automatic free fall. 0: Always enabled	0 to 65535	0

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

Category address symbol	Name	Descriptions	Range and choices	Default
59 F-31	Batch monitoring timer	Set the upper limit of the time of sequence. If the sequence is not finished, sequence error SO.ERR4 is displayed. If 0 is set, the timer does not work.	0 to 65535 **s**	0 **s**
59 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**
59 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**
59 F-34	Medium flow comparison interrupt timer		0.0 to 25.5 **s**	0.0 **s**
59 F-35	Dribble flow comparison interrupt timer		0.0 to 25.5 **s**	0.0 **s**

Category address symbol	Name	Descriptions	Range and choices	Default
59 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**
59 F-37	Eval delay timer	Set the time between closing dribble flow and comparing the result. Refer to Eval conditions [59 F-13]	0.1to 25.5 **s**	0.1 **s**
59 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**
59 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**
59 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**
59 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**
59 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**
59 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**
59 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**
59 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**
59 F-48	Averaging Eval time	Set the time to average the result. This time controls precision of the result. Refer to Eval delay timer [59 F-37] and Eval conditions [59 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
59 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
59 F-53	Hide elements of the material code	Select the parameter to hide the 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
59 F-55	Add Final value and zero band	0: No (Not added) 1: Yes (Add)	0 to 1	1
59 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

59 F-61	Automatic 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

59 F-62	Automatic 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
59 F-71 to 59 F-75		A 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. Refer to "7.5.11. Error Message and Alarm". These safety checks can be used during the sequence. Bit 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 0: No (Not used) 1: Yes (Used)		
59 F-71	Batching safety check	If the assigned input is inactive during the weighing sequence, a sequence error occurs.	00000000 to 11111111	00000000
59 F-72	Discharge safety check	If the assigned input is inactive during the discharge sequence, a sequence error occurs.		
59 F-73	Recipe safety check	If the assigned input is inactive during the recipe sequence, a sequence error occurs.		
59 F-74	Mixing safety check	If the assigned input is inactive during the mixing sequence, a sequence error occurs.		
59 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	Mixting	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.
In F - 1	Input terminal A1	Zero	1
In F - 2	Input terminal A2	Tare	3
In F - 3	Input terminal A3	Tare clear	4
In F - 4	Input terminal A4	Batch start	5
In F - 5	Input terminal A5	Emergency stop	13
In F - 6	Input terminal A6	Material / Recipe code, BCD 1	14
In F - 7	Input terminal A7	Material / Recipe code, BCD 2	15
In F - 8	Input terminal A8	Material / Recipe code, BCD 4	16
In F - 9	Input terminal A9	Pause	22
In F - 10	Input terminal A10	Restart	23
In F - 11	Input terminal A11	Error reset	44

AD-4402

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 **DF**
1	Stable	31	Net display	61	Material hopper 3 **FF**
2	Zero band	32	During hold	62	Material hopper 3 **MF**
3	Full (Full filling)	33	Internal reservation	63	Material hopper 3 **DF**
4	Full flow	34	Recipe read error	64	Material hopper 4 **FF**
5	Medium flow	35	Material hopper 1	65	Material hopper 4 **MF**
6	Dribble flow	36	Material hopper 2	66	Material hopper 4 **DF**
7	Over	37	Material hopper 3	67	Material hopper 5 **FF**
8	OK	38	Material hopper 4	68	Material hopper 5 **MF**
9	Under	39	Material hopper 5	69	Material hopper 5 **DF**
10	Internal reservation	40	Material hopper 6	70	Material hopper 6 **FF**
11	Internal reservation	41	Material hopper 7	71	Material hopper 6 **MF**
12	Mixing	42	Material hopper 8	72	Material hopper 6 **DF**
13	Discharge (Open the discharge gate)	43	Material hopper 9	73	Material hopper 7 **FF**
14	Batch finish	44	Material hopper 10	74	Material hopper 7 **MF**
15	Recipe finish	45	Material hopper 11	75	Material hopper 7 **DF**
16	Discharge finish	46	Material hopper 12	76	Material hopper 8 **FF**
17	Mixing finish	47	Material hopper 13	77	Material hopper 8 **MF**
18	Nozzle down	48	Material hopper 14	78	Material hopper 8 **DF**
19	Online. If sequence is enabled, 0.5 sec. pulse is output.	49	Material hopper 15	79	Material hopper 9 **FF**
20	Weighing sequence in process	50	Material hopper 16	80	Material hopper 9 **MF**
21	Input acknowledge. If there is a input signal, 0.5 sec. pulse is output.	51	Material hopper 17	81	Material hopper 9 **DF**
22	Weighing sequence error	52	Material hopper 18	82	Material hopper10 **FF**
23	Alarm 1	53	Material hopper 19	83	Material hopper10 **MF**
24	Alram 2	54	Material hopper 20	84	Material hopper10 **DF**
25	Zero error	55	Material hopper 1 **FF**		
26	Capacity exceeded (Out of range)	56	Material hopper 1 **MF**		
27	Buzzer	57	Material hopper 1 **DF**		
28	During tare	58	Material hopper 2 **FF**		
29	Center of zero	59	Material hopper 2 **MF**		

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

AD-4402

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 val value/ Net ue/ 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 7: Modbus	1 to 7	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	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**
r5 F- 12	Processs print of recipe	0: No recipe printing 1: Mode 1 2: Mode 2 3: Mode 3	0 to 3	0

Category address symbol	Name	Descriptions	Range and choices	Default
⌐5 F- l∃	Print for data & time	0: Do not print date and time. 1: Print the date before the recipe printing. 2: Print the time before the recipe printing. 3: Print the date and time before the recipe printing. 4: Print the date after the recipe printing. 5: Print the time after the recipe printing. 6: Print the date and time after the recipe printing.	0 to 6	0

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

Category address symbol	Name	Descriptions	Range and choices	Default
ΓL F- I	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
ΓL F- 2	Communication mode	1: Stream mode 2: Auto print mode 3: Manual print mode 4: Print at total	1 to 4	1
ΓL F- 3	Baud rate	1: 600 bps 2: 1200 bps 3: 2400 bps	1 to 3	3
ΓL 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**
ΓL F- 5	Parity check	0: Not used 1: Odd 2: Even	0 to 2	2
ΓL F- 6	Character length	7: 7 bits 8: 8 bits	7, 8	7
ΓL F- 7	Processs print of recipe	0: No recipe printing 1: Mode 1 2: Mode 2 3: Mode 3	0 to 3	0
ΓL F- 8	Print for data & time	0: Do not print date and time. 1: Print the date before the recipe printing. 2: Print the time before the recipe printing. 3: Print the date and time before the recipe printing. 4: Print the date after the recipe printing. 5: Print the time after the recipe printing. 6: Print the date and time after the recipe printing.	0 to 6	0

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	Material hopper 1 Medium flow	0 to 84	56
02 F- 2	Output terminal 2	Material hopper1 Dribble flow	0 to 84	57
02 F- 3	Output terminal 3	Material hopper 2 Medium flow	0 to 84	59
02 F- 4	Output terminal 4	Material hopper 2 Dribble flow	0 to 84	60
02 F- 5	Output terminal 5	Material hopper 3 Medium flow	0 to 84	62
02 F- 7	Output terminal 7	Material hopper 3 Dribble flow	0 to 84	63
02 F- 8	Output terminal 8	Material hopper 4 Medium flow	0 to 84	65
02 F- 9	Output terminal 9	Material hopper 4 Dribble flow	0 to 84	66
02 F- 10	Output terminal 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 the communication mode [r5 F- 2] is used, 1, 2 or 3 can be selected. And if freeze mode is used in jet stream mode, the 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	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	Charactor 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 04 F- 7	Terminator	1: CR CR: 0Dh 2: CR LF LF: 0Ah	1 to 2	2

Category address symbol	Name	Descriptions	Range and choices	Default
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 **s**	0.00 **s**
03 F-11	RS-422 / 485 switch	1: RS-422 2: RS-485	1 to 2	1
03 F-12 04 F-12	Processs print of recipe	0: No recipe printing 1: Mode 1 2: Mode 2 3: Mode 3	0 to 3	0
03 F-13 04 F-13	Print for data & time	0: Do not print date and time. 1: Print the date before the recipe printing. 2: Print the time before the recipe printing. 3: Print the date and time before the recipe printing. 4: Print the date after the recipe printing. 5: Print the time after the recipe printing. 6: Print the date and time after the recipe printing.	0 to 6	0

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		0 to 50	0
05 F- 2	Input terminal	A2	Set the number of the function.	0 to 50	0
05 F- 3	Input terminal	A3		0 to 50	0
05 F- 4	Input terminal	A4	**Caution**	0 to 50	0
05 F- 5	Input terminal	A5	**Avoid selecting the same function**	0 to 50	0
05 F- 6	Input terminal	A6	**for multiple terminals and keys.**	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 60 Hz (AD-4402)
	24 VDC ±20% (AD-4402D)
Power consumption	Approximately 30 VA (AD-4402)
	Approximately 30 W (AD-4402D)
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 ℃ to 40 ℃
Battery life of backup RAM	typ. 10 years at 25 ℃. 5 years at 40 ℃.

Analog to Digital Unit

Input sensitivity	Up to 0.3 μV / 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 MΩ
Load cell excitation voltage	10 V DC $\pm$5%
Maximum load cells	8 pieces in parallel with 350Ω load cell
Span temperature coefficient	8 ppm/ ℃
Zero temperature coefficient	0.2 μV + 8 ppm/ ℃ of dead load typ.
Non-linearity	0.01 % of F. S.
Input noise	Below ± 0.3 μVp-p
A/D conversion	Δ-Σ 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	Load cell 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△ 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 the 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, Load cell 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 "8.4. Built-in Current Loop Output".

BCD Output of Option OP-01
Refer to "8.5. BCD Output of Option, OP-01".

Relay Output of Option OP-02
Refer to "8.6. Relay Output of Option OP-02".

RS-422/485 Interface of Option OP-03
Refer to "8.7. RS-422/485 Interface of Option OP-03".

RS-232C Interface of Option OP-04
Refer to "8.8. RS-232C Interface of Option OP-04".

Parallel I/O of Option OP-05
Refer to "8.9. Parallel I/O of Option OP-05".

Analog Output of Option OP-07
Refer to "8.10. 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

186$^{+1.1}_{-0.0}$

92$^{+0.8}_{-0.0}$

Panel cutout size

192

(177)

134.2

20

96

91

185
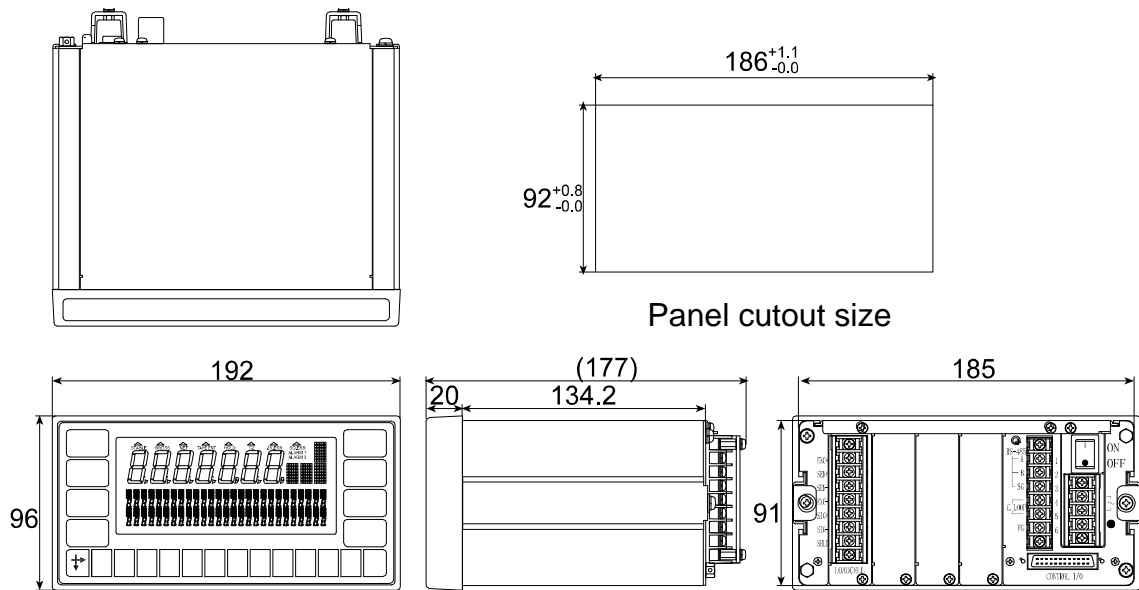
◆ 11.2. Accessories

Capacity label 1
I/O connector 1
I/O connector cover 1
RS-485, terminator resistor 100 Ω 1
Cover of power supply terminal 1
Cover of RS-485 and current loop 1
Cover of load cell terminal 1
Rubber packing for mounting to panel 1

12. References

12.1. Abbreviations

#	counts	Neg	negative
#Tot	total count	NT	net
0Band	zero band	NWT	net weight
0T	tare is not used	Op.	optional
ADC	Analog to digital converter	OPP1m	Optional Preliminary
AFFC	active free fall compensation	P I/O	parallel I/O
Brate	baud rate	P1m	Preliminary
CZ	center of zero	PLC	programmable logic controller unit
d	division	PT	preset tare
DFlow	dribble flow	RTot	recipe total
Eval	evaluation, (criteria)	RTot#	recipe total count
FFall	free fall	SF	supplemental flow (compensation flow)
FFlow	full flow		
FNC	function	SFOT	Supplementary Flow Open Timer
GS	gross	SFCT	Supplementary Flow Close Timer
Hop.	Hopper	T	tare
I/O	input / output	TC	Tare clear
IDF	initial dribble flow	Tot	Total Weight
IFF	initial medium flow	Tot#	Total Count
L	load cell	TR	tare
LC	load cell	w/	with
MCode	material code	w/0	with zero
MFlow	medium flow	WGT	weight
		WGTTot	weight total
		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	○

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