AD-4405A

OP-03/05/07/08

WEIGHING INDICATOR

INSTRUCTION MANUAL

A&D Company, Limited

1WMPD4002030B

This Manual and Warning Definitions

The warnings described in this manual have the following meanings:

CAUTION	Disregarding the caution could result in loss of important data or damage to the instrument
Note	Provides information useful for the user to operate the instrument.

⚠ This is a hazard alert mark.

The contents of this manual and the specifications of the instrument covered by this manual are subject to change for improvement without notice.

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

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. Introduction

- The AD-4405A is a weighing indicator that amplifies the signal from a load cell, converts it to digital data and displays it as a mass value.

- This indicator has the following performance:

    Input sensitivity .... 0.15 μV/division.
    Maximum display .... 40000 divisions.
    Refresh rate of the display .... 10 times/second approximately.
    Input voltage range .... -35 mV to +35 mV.

- The following standard functions are available:
    - The HiHi / Hi / OK / Lo / LoLo limit comparison to check a mass value.
    - The setpoint comparison for batching applications.
    - The counting function for piece counting.
    - The preset tare function.
    - Four code memories to store the above mentioned data.
    - The accumulation function to totalize the mass values and to count the number of accumulations.
    - The hold function enables weighing a living animal.
    - UFC (Universal Flex Coms) function to customize the protocol of the printing format as well as outputting data using the serial interface.
    - 0 - 9 keys enables easy operation, such as setting of comparator values.
    - Built-in calendar clock with backup battery.

- The following options are available:

    Interfaces: One interface can be installed in the indicator at a time.

    An RS-232C serial interface is standard, to communicate with a computer, printer or a remote display. This interface outputs data and can request weight data, enter parameters and control the state of the indicator.
    - OP-03: RS-422/485 and 3-Relay Outputs
    - OP-05: RS-232C, 3-Relay Outputs and 3-Control Inputs
    - OP-08: RS-232C, Current Loop Output, 3-Relay Outputs and 1-Control Input
    - OP-07: Analog Output (4-20mA)

    Printer
    - OP-06: Dot matrix impact printer
    - OP-10: Panel mount kit

- The calibration function includes the following functions:
    - Setting of the minimum division (weighing interval) and the maximum capacity.
    - Zero and span calibration.
    - The weighing range function of the multi-interval weighing instrument (scale).
    - Digital linearization function.
    - Gravity compensation function.

3. Installation and Precautions

3.1. Installation and Precautions

- ❑ The AD-4405A weighing indicator is a precision electronic instrument. Handle it carefully.
- ❑ The operating temperature is -10°C to +40°C (14°F to 104°F).
- ❑ Do not install the scale in direct sunlight.
- ❑ Mis-operation or other problems may be caused by an unstable power source including momentary power failure or instantaneous noise. Use a stable power source.
- ⚠ ❑ Do not connect the power cord before the installation has been completed. Do not handle the power cord with wet hands.
- ⚠ ❑ Verify that the local voltage and receptacle type are correct for your indicator.
- ❑ Use shielded cables for all connections. Connect the cable shields to the shield terminal or case as an earth terminal.
- ❑ Earth ground the indicator. Do not share the earth ground line with other electrical power equipment. There is an earth ground terminal at the power cord receptacle.
- ❑ Do not install the indicator in a place where it is apt to be charged with static electricity, or where the relative humidity is lower than 45%RH. Plastic and insulating materials are apt to be charged with static electricity.
- ❑ Even if the display is turned off, the power is on while the power cord is connected to the AC power source.

3.2. Load Cell Connections

- ❑ Connect the load cell wires to the connector (receptacle) located on the rear panel, using the accessory load cell plug.
- ❑ It is possible to connect a 4 wire cable provided that pins 1-2 and pins 3-4 are connected, if the distance between the indicator and the load cell is shorter than 5m. At this time, use a cable with a wire having a cross-sectional area of 0.5 mm^2 or greater because thin cables will decrease the temperature coefficient.
- ❑ The output voltage of a load cell is a very sensitive signal. Space the load cell cable away from any noise source.
- ❑ It is possible to connect four 350ohm load cells.
  The load cell drive is 5VDC ± 5% between EXC+ and EXC-, the maximum current 60mA.
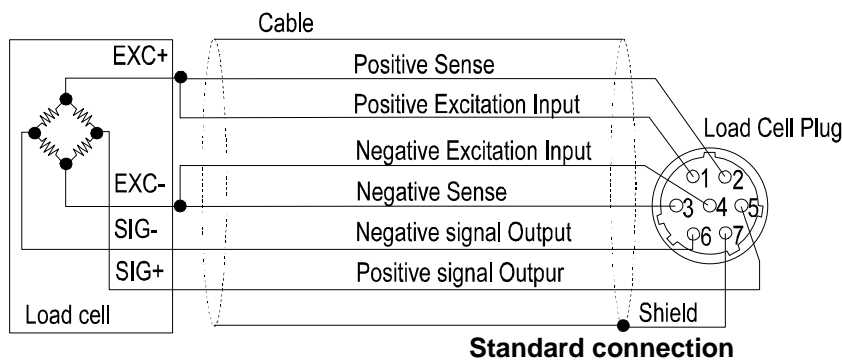
Standard connection
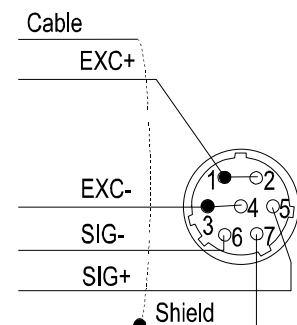
Connection available for a cable shorter than 5m.
(Recommended wire cross- sectional area: 0.5 mm^2 or greater)

⏷ 3.3. Adjustment of the Load Cell Output

Caution ❑ **When adding a resistor to adjust a load cell output, use a metal film resistor in the range of 50kohm to 500kohm with a good temperature coefficient. Use as large of a resistance value as possible in the range in which the zero adjustment is possible. Solder this resistor at a point near the load cell or the indicator.**

In Case of Reducing the Output Voltage

When the zero output is too large, add a resistor between EXC+ and SIG-.
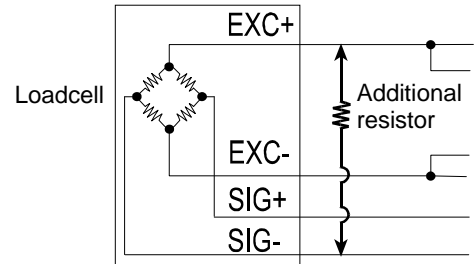
In Case of Adding an Offset Voltage to the Output

When the zero output is too small, add a resistor between EXC+ and SIG+.
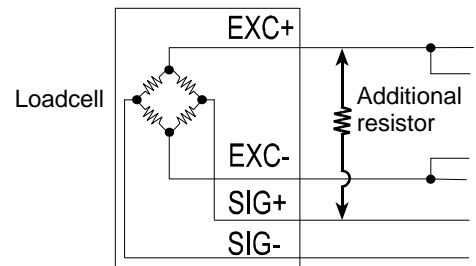
⏷ 3.4. Verifying Load Cell Output and Input Sensitivity

The input sensitivity of the indicator is $0.15\mu V$ /division or more. Satisfy the following inequality, when you design a weighing instrument using the indicator and load cell(s).

Caution ❑ **A change in input voltage sensitivity is required to cause a one division change of the display. Select as large an input 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.	$0.15 \leq \dfrac{E * B * D}{A}$	A: Rated capacity of load cell [kg] B: Rated output [mV/V] D: Weighing interval [kg]
Weighing instrument using multi-load cell	$0.15 \leq \dfrac{E * B * D}{A * N}$	E: Excitation voltage [mV] N: Number of load cells

Verification Example

Design:		
Load cell	N=1	$\dfrac{5000 * 3 * 0.05}{750} = 1 \geq 0.15$
Rated capacity	A=750 [kg]	
Rated output	B=3 [mV/V]	
Excitation voltage	E=5000 [mV]	Therefore, regard the instrument as a good design.
Weighing interval	D=0.05 [kg]	
Weighing capacity	300 [kg]	

⬇ 3.5. Installing an Option Board

Install an interface (OP-03, OP-05, OP-07 or OP-08) as follows:

Caution ❑ **Do not remove any screws other than described below.**

Step 1   Remove the power cord from the electrical outlet and other cables from the indicator.

Step 2   Remove two screws from the rear blank panel.

Step 3   Remove the rear blank panel.

Step 4   Remove the cable from the rear blank panel.

Step 5   Connect the cable that was removed in step 4 to the new option board.
Be sure to orientate the connector correctly.

Step 6   If the option board has an earth terminal (OP-05, OP-08), connect the earth cable in the indicator to that terminal.

Step 7   Insert the option board into the indicator.

Step 8   Secure the option board panel using two screws.

Step 9   Insert the power cord into the electrical outlet and press the ON/OFF key to turn the display on. Set the F-Function, $F30$, depending on the option used.
   OP-03, OP-05, OP-08: $F30\ 2$ (Serial output)
   OP-07: $F30\ 1$ (Analog output)

4. Description of Panels and Symbols

4.1. Front Panel Description
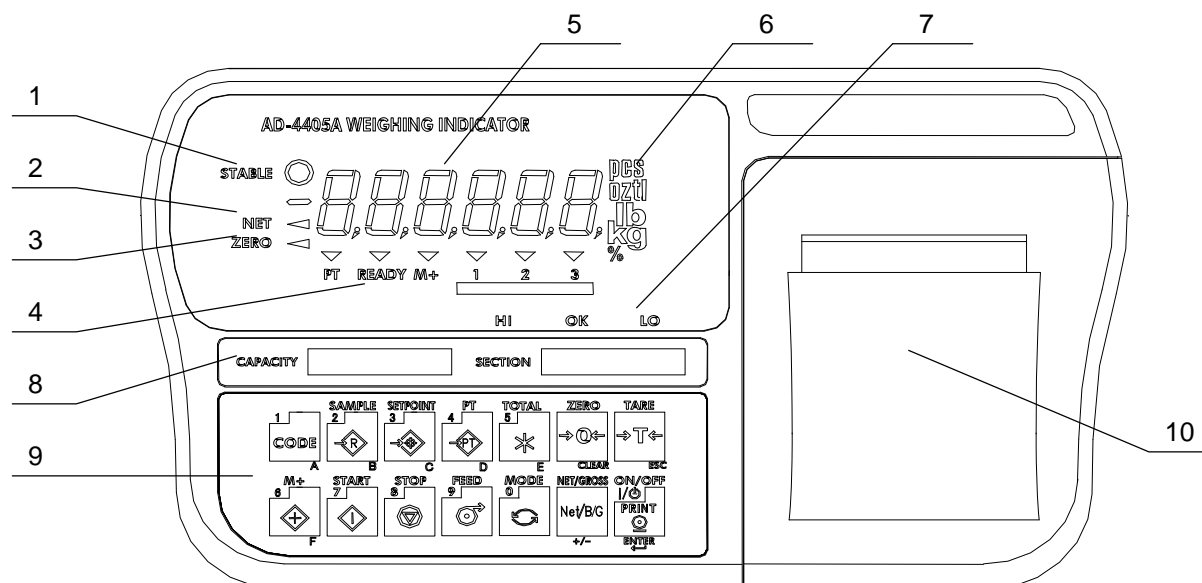
No.	Name	Description
1	STABLE	Indicates when the display is stable.
2	NET	Indicates when the display is the net weight.
3	ZERO	Indicates when the display weight is in the Zero range.
4	Annunciator	Indicates various weighing status or functional selection.
	PT	Indicates when PRESET TARE value is being used.
	READY	Indicates the state of comparison or batching.
	M+ (Accumulation)	Indicates when there is a result of addition or accumulation.
	1,2,3 (Triangle▼)	Depending on the function selected, indicates various states.
5	MAIN display	Displays the weight, accumulated data or stored parameters.
6	UNIT part	Unit used to weigh.
7	HI/OK/LO	Indicates the result of comparison.
8	Capacity label	To note the capacity and division. (provided as an accessory)
9	Key switches	To display, output and perform various settings
	CODE key	The key to select the code memory.
	SAMPLE key	The key to set the unit weight for the counting function.
	SETPOINT key	The key to set the comparator value.
	PT key	The key to set the PRESET TARE value.
	TOTAL key	The key to display the total weight.
	M+ key	The key to perform accumulation.
	START key	The key to start comparison / batch weighing.
	STOP key	The key to stop comparison / batch weighing.
	FEED key	The key to feed the paper of the optional Printer.
	MODE key	The key to switch units or setting parameters.
	0 – 9 key	The key to input any numerical settings.
	A – F key	Used to enter setting values (press NET/GROSS key at a time).

	ZERO key	The key to zero the current display.
	CLEAR key	The key to clear the setting value.
	TARE key	The key to perform tare.
	ESC key	The key to proceed to the next step without changing the parameter set.
	NET/GROSS key	The key to select net or gross weight in the display.
	+/- key	The key to select + or – of a value.
	ENTER key	The key to confirm settings and store the values.
	PRINT key	The key to print/output data.
	ON/OFF key	Turns the display on and off (OFF: hold for 3 seconds).
10	Printer cover	Printer paper will be stored inside when the printer is installed.
	Printer	Dot matrix printer (optional).

4.2. Rear Panel Description
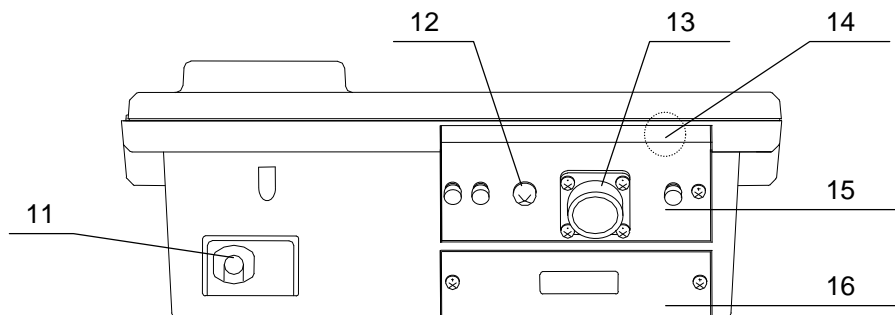
No.	Name	Description
11	Power cord	Connect to the AC power source.
12	Grounding terminal	Connect to the Earth (M4 size screw).
13	Load cell connector	Connect a load cell using the accessory load cell plug.
14	CAL key cover	The CAL key is located behind the sealing panel [15].
15	Sealing panel	For type approval, available with the sealing wire posts.
16	RS232C connector	Exchange this when installing other data output (Options).

4.3. Other Displays and Symbols

.	Standby display.
- - - - - -	Zero error when turning the display on. If the ESC key is pressed, the current weighing value may be displayed.
Blank / Decimal point	Overload display. Remove any load from the load cell immediately. It may cause damage to the load cell.
Err 12	An example of an error display.

▼ 4.4. Accessories and Options

Standard accessories

Accessories	Instruction manual	1	
	Load cell plug	1	JM-NJC-207-PF
	0.2A or 0.315A time lag fuse	1	FS-EAWK-200MA FS-EAWK-315MA
	Capacity label	1	
	Annunciator label	1	

Caution   **Please confirm that the receptacle type and local voltage is correct for your indicator (scale).**

Options

OP-03 (AD-4405-03) *	RS-422/485 interface, 3-Relay outputs
OP-05 (AD-4405-05) *	RS-232C interface, 3-Relay outputs and 3-Control inputs
OP-06 (AD-4405-06)	Dot matrix impact printer (16 characters/line)
OP-07 (AD-4405-07) *	4-20mA analog output
OP-08 (AD-4405-08) *	RS-232C interface, 20mA current loop output, 3-Relay outputs and 1-Control input
OP-10 (AD-4405-10)	Panel mount kit (Panel attachment and load cell input terminal block)

*Only one interface option can be installed at a time.

Consumables sold separately (for printer)

Printer Paper	AX-PP-156-S (10 rolls)
Ink Ribbon	AX-EWRC05-S (5 pcs.)

⬇ 5. Calibration

This indicator, converts an input voltage from a load cell to the "mass" value, and displays it. Calibration is the adjustment function so that the scale (indicator) can display the weight correctly.

⬇ 5.1. Items of Calibration Mode

There are four items in the calibration mode.

How to enter the calibration mode:

In the weighing mode, press the CAL key which is located behind the sealing panel. $\boxed{CAL\ in}$ is displayed for 2 seconds and then $\boxed{CAL\ 0}$ will appear. Use the $\boxed{MODE}$ key to select an item and use the $\boxed{ENTER}$ key to execute it.

NOTE: Calibration could be started by simultaneously pressing the $\boxed{ZERO}$ and $\boxed{TARE}$ keys, instead of the $\boxed{CAL}$ key. The procedure is prohibited when the indicator has received a certified approval.

Items Required to be Performed

$\boxed{CALSEt}$ Sets capacity, resolution, decimal point position and display format, weighing range and unit. These items should be set first in order for the indicator to function as a weighing instrument. Set values do not need to be changed again unless the indicator itself is replaced. For details, refer to "5.2.1. Configuring a Weighing Instrument".

$\boxed{CAL\ 0}$ Calibrates zero and span. This is required after installation, to get accurate data. For details, refer to "5.2.3. Zero Calibration" and "5.2.4. Span Calibration".

Optional Items to be Performed as Necessary

$\boxed{Lnr\ 0}$ Performs digital linearization. Refer to "5.4. Digital Linearization Function".

$\boxed{G\ SEt}$ Compensates for acceleration of gravity. Refer to "5.5. Gravity Compensation Function".

Gravity compensation function: Compensates for weighing error between the calibration location and another weighing location using gravity acceleration.

In the calibration mode, the keys have functions as follows:

$\boxed{0}$ - $\boxed{9}$ Numerical keys.

$\boxed{MODE}$ The key to display other items.

$\boxed{CLEAR}$ The key to restore the numerical value to the initial setting or to change the parameters.

$\boxed{+/-}$ The key to display other parameters.

$\boxed{ESC}$ The key to proceed to the next step without changing set values.

$\boxed{ENTER}$ The key to store new calibration data and proceeds to the next step.

CAL   The key to store all of the parameters into memory and display $\boxed{\mathsf{CAL \, oFF}}$.
            Press the $\boxed{\text{ON/OFF}}$ key to turn off the display.
            Note that the $\boxed{\text{ON/OFF}}$ key does not function alone in the calibration mode.
            When a value is mistakenly set, press the $\boxed{\text{ESC}}$ key while holding the
            $\boxed{\text{ON/OFF}}$ key to finish the calibration mode without storing the value. After
            $\boxed{\mathsf{CAnCEL}}$ is displayed, press the $\boxed{\text{ON/OFF}}$ key to exit from the calibration mode
            and turns the display off.
NOTE: $\boxed{\mathsf{CAL \, oFF}}$ can be displayed by pressing the $\boxed{\text{+/-}}$ key while pressing the $\boxed{\text{ON/OFF}}$ key,
            instead of $\boxed{\text{CAL}}$ key.

Caution   ❑ **The maximum display is less than or equal to 40000 divisions. This number**
              is calculated from the maximum capacity divided by the minimum division.
              ❑ **Check the accuracy of the weighing instrument periodically.**
              ❑ **Recommended mass, use a mass heavier than 2/3 maximum capacity.**
              ❑ **Calibrate the scale, if it is moved to another location or the environment**
              has changed.
              ❑ **It is not necessary to set the gravity acceleration correction, when calibrating**
              the scale with a calibration mass at the place where the scale is used.
              ❑ **Enter the stable weighing data while the STABLE mark is displayed. If**
              unstable data is used, it may cause a weighing error. Arrange the
              condition using the F00 filter function.
              ❑ **The span calibration needs the zero calibration data. We recommend**
              that you perform the span calibration immediately after the zero
              calibration.
              ❑ **If you use the dual range function of the multi-interval scale, perform the**
              "Range Function", "Zero Calibration" and "Span Calibration".

⬇ 5.2. Calibration Procedure

5.2.1.   Configuring a Weighing Instrument

This section explains how to set capacity, resolution, decimal point position and display
format, weighing range and unit. Perform this procedure when installing the indicator.

When $\boxed{\mathsf{CAL \, SEt}}$ is displayed, enter the setting mode by pressing the $\boxed{\text{ENTER}}$ key.

Setting the range and unit.

$\boxed{\text{Single Range}}$
Select the resolution, decimal point position and format.
        ↓
Specify the weighing capacity.

Dual Range

<First range> Select the resolution, decimal point position and format.
    ↓
<First range> Select the weighing range
    ↓
<Second range> Select the resolution
    ↓
<Second Range> Specify the weighing capacity

For the range function, refer to "5.3. Weighing Range Function".

Specifying the Range and Unit

Step 1   The range and unit of measure are displayed.

Range display : $\boxed{5\,inGL}$: single range

                      $\boxed{dUAL}$: dual range

To change the range function, use the $\boxed{\text{CLEAR}}$ key

Unit display: The active unit is displayed. The unit can be changed; such as kg or lb. Calibration is performed with the displayed unit.

Press the $\boxed{\text{MODE}}$ key to select a unit.

Press the $\boxed{\text{+/-}}$ key to select a unit for calibration. The unit for calibration (first unit) is displayed and the alternate unit (second unit) is blinking.

$\boxed{\text{ENTER}}$ Stores the parameter displayed and proceed to the next step.

$\boxed{\text{ESC}}$ Proceeds to the next step without changing the parameter.

Specifying the Resolution, Decimal Point Position and Format

Step 2   The resolution will be displayed as $\boxed{d\quad 0.1}$, with decimal point. Triangle 1 and the first unit selected at the previous step will be displayed.

Specify the position of the decimal point with the $\boxed{\text{CLEAR}}$ key. Specify the display format (point or comma) with the $\boxed{\text{+/-}}$ key. Specify the resolution with the $\boxed{\text{MODE}}$ key.

The decimal point format, specified in this step, will only apply to the display. The decimal point format for serial data output is selected using the F-function settings.

Press the $\boxed{\text{ENTER}}$ key to store the parameters and then proceed to the next step.

Using the $\boxed{\text{ESC}}$ key, regardless of what is displayed, the indicator will proceed to the next step without changing the parameters.

Specifying the Weighing Range of the First Range

Step 3   After displaying $\boxed{\mathit{CAP}}$ for 2 seconds, the first range or the weighing capacity of single range will be displayed. When dual range is used, $\boxed{\mathit{CAP\ 1}}$ is displayed for 2 seconds. Triangle ▼ 1 will be displayed.

Specify the parameter using the $\boxed{0}$ - $\boxed{9}$ keys and press the $\boxed{\text{ENTER}}$ key to store it and proceed to the next step. When pressing the $\boxed{\text{ESC}}$ key, regardless of what is displayed, the indicator will proceed to the next step without changing the parameter. The next step is Zero Calibration in single range or the second range resolution in dual range.

Specifying the Second Range Resolution

Step 4   After displaying $\boxed{\mathit{rAnGE2}}$ for 2 seconds, the resolution with decimal point and triangle ▼ 2 will be displayed. Specify the second range resolution in the same way as the first range. The decimal point cannot be moved. Specify the second range resolution greater than the first range.

Press the $\boxed{\text{ENTER}}$ key to store the parameter and proceed to the next step. When pressing the $\boxed{\text{ESC}}$ key, regardless of what is displayed, the indicator will proceed to the next step without changing the parameter.

Specifying the Second Range Capacity

Step 5   After displaying $\boxed{\mathit{CAP2}}$ for 2 seconds, the capacity with unit and decimal point is displayed. Specify the capacity in the same way as the first range capacity. The value should be greater than the first range capacity.

Press the $\boxed{\text{ENTER}}$ key to store the parameter and proceed to Zero Calibration. When pressing the $\boxed{\text{ESC}}$ key, regardless of what is displayed, the indicator will proceed to the next step without changing the parameter.

5.2.2. To Get Stabilized Data

Step 6   Maintain the following conditions to calibrate the scale (indicator) correctly.

❑   Maintain a constant temperature, stable power and stable input voltage from the load cell.

❑   Avoid direct sunshine or the near the outlet of an air conditioner.

❑   Do not install the scale (indicator) where there is a strong magnetic field.

Step 7   Turn the display on and leave it for several minutes.

5.2.3.　　　　　Zero Calibration

Step 8　Start with the `CAL 0` display.

Select a zero calibration method to adjust the zero point

Weighing input (Normal way)	The adjustment method with nothing on the weighing unit.	To step 9
Digital input	The numerical way to enter a load cell output voltage.	To step 10

Weighing Input

Step 9　Place nothing on the weighing unit. Wait for the STABLE mark to turn on and press the ENTER key. The new zero point parameter will be stored. Proceed to step11.

ESC key .... The key to proceed to the next step without changing the parameter.

Caution: Do not press the ENTER key while the STABLE mark is off (detecting motion). Arrange the condition using the F00 filter function.

Digital Input

Step10　Press the +/- key to display the input voltage parameter of the zero point in the unit of mV/V.

Adjust the input voltage using the 0 - 9 keys.

ENTER ...... The key to store the parameter and proceed to the next step.

ESC key .... The key to proceed to the next step without changing the parameter.

Zero

`CAL 0`

Place nothing on the weighing unit (No load)

Turn on STABLE mark

PRINT ⊙ / ENTER

Stored input voltage

NET/GROSS
Net/B/G +/-

`0.1000` mV/V

0 — 9

`0.5000` mV/V

PRINT ⊙ / ENTER　New input voltage

To Span Calibration

5.2.4.　Span Calibration

Step11　After displaying `CAL F` for 2 seconds, the capacity is displayed.

Select a span calibration method to adjust the capacity.

Weighing a mass less than the maximum capacity	The method to weigh a mass less than the maximum capacity.	To step 12
Weighing a maximum capacity mass	The method to weigh a mass equivalent to the maximum capacity.	To step 14
Digital input	The numerical way to enter a load cell output voltage.	To step 16

Weighing a Mass less than the Maximum Capacity

Step12   Set a mass value using the ⓪ - ⑨ keys.

Step13   Place a mass equivalent to the displayed value
on the weighing unit. Proceed to step 15.

Weighing a Maximum Capacity Mass

Step14   Place a mass equivalent to the maximum
capacity on the weighing unit.

Step15   Wait for the STABLE mark to turn on and
press the ENTER key. Proceed to step17.
ESC key .... The key to proceed to step17
without changing the parameter.

**Caution:Do not press the ENTER key while the
STABLE mark is off (detecting motion).
Arrange the condition using the F00 filter
function.**

Digital Input

Step16   Press the +/- key to display the input voltage
parameter of the span in the unit of mV/V.
Adjust the input voltage using the ⓪ - ⑨ keys.
(It is possible to store a greater value than
the capacity.)
ENTER key ..... The key to store the parameter
and proceed to step 17.
ESC key .... The key to proceed to step 17
without changing the parameter.
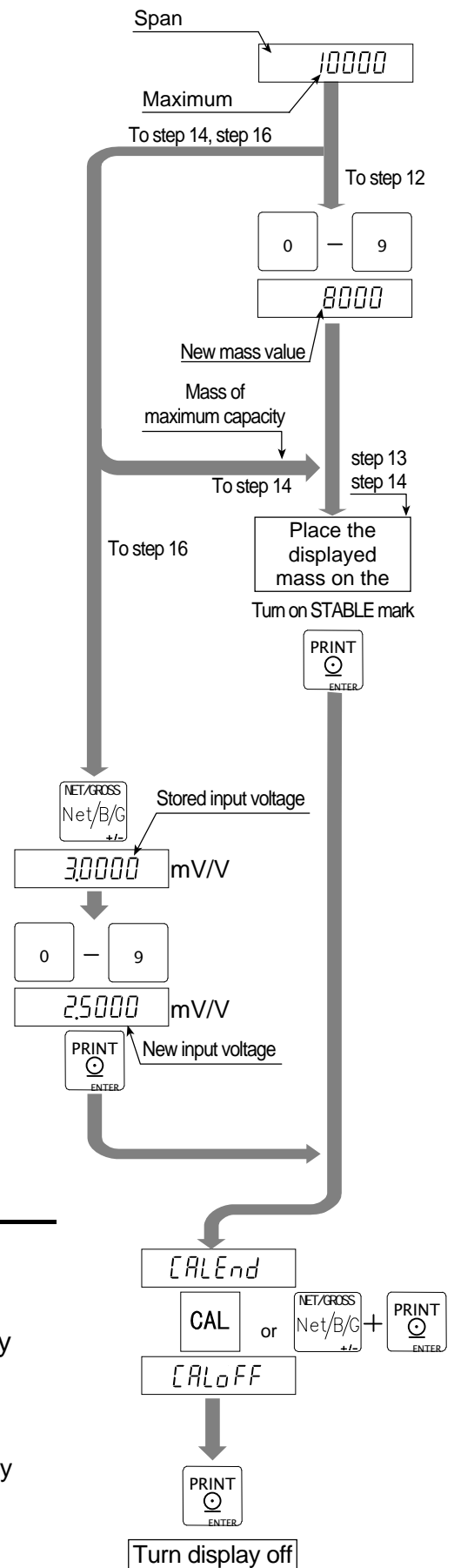
5.2.5.   Exiting the Calibration Mode

Step17 $CALEnd$ is displayed.
Use the following keys.
CAL key ..... To store the parameters and display
$CALoFF$. Proceed to the next step.
$CALoFF$ can be displayed by pressing
the +/- key while pressing the ON/OFF key
instead of CAL key.
ESC key ..... The key to store the parameters
temporarily. Proceed to the $CAL\ 0$
display.

Span
10000

Maximum
To step 14, step 16

To step 12

| 0 | — | 9 |

8000

New mass value

Mass of
maximum capacity

step 13
step 14
To step 14

To step 16

Place the
displayed
mass on the

Turn on STABLE mark

PRINT ⊙ ENTER

NET/GROSS Net/B/G +/-   Stored input voltage

3.0000 mV/V

| 0 | — | 9 |

2.5000 mV/V

PRINT ⊙ ENTER   New input voltage

$CALEnd$

CAL   or   NET/GROSS Net/B/G +/- + PRINT ⊙ ENTER

$CALoFF$

PRINT ⊙ ENTER

Turn display off

Press and hold the ON/OFF key and press the ESC key

No parameters are changed, $\overline{[RnEEL]}$ is displayed and the calibration mode is finished.

Step18   Press the ON/OFF key to turn the display off.

⏬ 5.3. Weighing Range Function

The weighing range function can select "single range" or "dual range". Specify each weighing interval (division) for the multi-interval instrument. Each weighing interval is displayed according to a net value or gross value.

Caution ☐ **When single range is used, performing this function is not required.**

Example 1   The gross display.
Specified parameters:

First range	Range = 50.00kg, division 0.02kg
Second range	Range = 100.00kg (maximum capacity), division 0.1kg

Display

0kg to 50kg :	The first range, division 0.02kg.
50kg to 100kg :	The second range, division 0.1kg.

Division = 0.02kg

Division = 0.1kg

0kg   50kg   100kg Gross

Weighing value
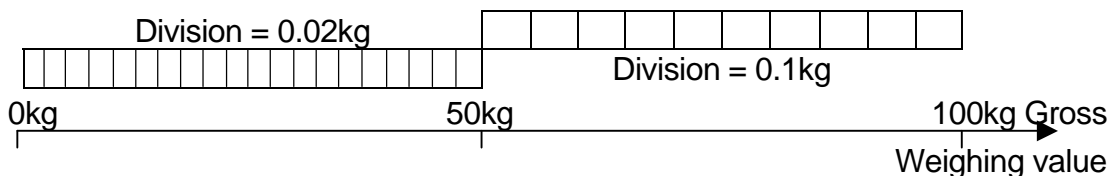
Example 2   The net display using a 40kg tare value.
Specified parameters: The same parameters as example 1.
Display

-40kg to 50kg :	The first range, division 0.02kg.
50kg to 60kg :	The second range, division 0.1kg.

Division = 0.02kg

Division=0.1kg

-40kg   0kg   50kg 60kg Net

Tare value   90kg 100kg Gross
40kg   Weighing value
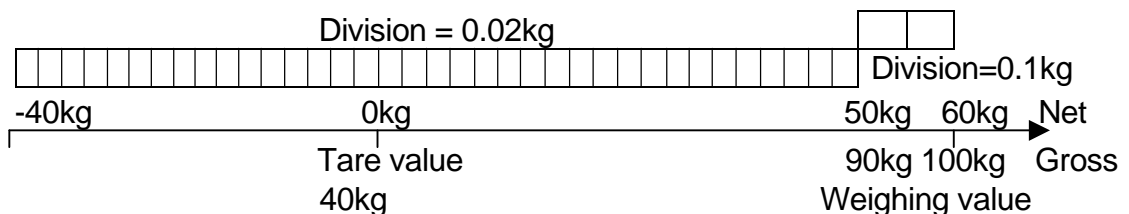
5.3.1.　Setting the Division and Range

Consider the following rules to design the weighing range.

Rule 1　Select the division and range of each weighing range so as to satisfy the following inequality.

The first range < the second range

The division of the next weighing range is automatically set larger than the division of the lower weighing range. Changing the division is possible.

Rule 2　When setting the dual range, the upper limit value of the second range becomes the maximum capacity.

Rule 3　Select a resolution smaller than 40000. The resolution is a value that divides the maximum capacity by the minimum division of the first range.

⬇ 5.4. Digital Linearization Function

Even if the zero and span calibration have been completed, there may still remain a linearity deviation caused by the performance of the weighing unit. The digital linearization function can rectify or reduce the linearity deviation using weighing points except zero and capacity. Up to three weighing points can be specified.

Caution　❑ **This function does not improve repeatability or hysteresis.**

❑ **Use the mass on the condition that** $Lnr\ 1 < Lnr\ 2 < Lnr\ 3$**.**

❑ **Do not press the** ENTER **key while the STABLE mark is off.**

Step 1　When $CAL\ 0$ is displayed, press the MODE key to display $Lnr\ 0$.

Step 2　Enter the zero point. Refer to "5.2.3. Zero Calibration".

Step 3　The value of the middle point is displayed after indicating $Lnr\ x$. x is 1, 2 or 3.
The triangle ▼ mark of the same number(x) is displayed along with the value.

Step 4　Select a middle point.

❑ If you want to cancel the current procedure, press the ESC key to finish this function. Proceed to step 7 and other points are cleared (canceled).

❑ Select a middle point value using the 0 - 9 keys. Proceed to step 5.

Step 5　Place a mass equivalent to the displayed value on the weighing unit. Wait for the STABLE mark to turn on and press the ENTER key. Proceed to step 6.

Step 6　If you include a 2nd and 3rd middle point, repeat steps 3, 4, 5 for each point.
If you finish this function, proceed to step 7.

Step 7　Perform step 11 of "5.2.4. Span Calibration" immediately.

⏬ 5.5. Gravity Compensation Function

❑ If the scale is used at the calibration location, it is not necessary to perform this function.

❑ If there is a difference of gravity acceleration between the installed location and calibration location it may cause a weighing error. This function specifies the gravity accelerations and corrects the span error.

Note ❑ **The decimal point is not displayed in the function. Example:** $\boxed{9798}$ **= 9.798 m/s^2**

❑ **When span calibration is executed, the gravity acceleration correction will be cleared and the two gravity acceleration values will return to the factory settings.**

Step 1 At the $\boxed{[\mathit{RL}\ 0]}$ display, press the $\boxed{\text{MODE}}$ key twice, $\boxed{\mathit{G\ 5EE}}$ is displayed and press the $\boxed{\text{ENTER}}$ key to enter the gravity compensation function.

If you want to cancel the current procedure, press and hold the $\boxed{\text{ON/OFF}}$ key and press the $\boxed{\text{ESC}}$ key. Then, no parameters are changed and the calibration mode is finished. Press the $\boxed{\text{ON/OFF}}$ key to turn the display off after displaying $\boxed{\mathit{[RnEEL}}$.

Step 2 The parameter is displayed with triangle 1. Enter the gravity acceleration of the calibration location using the $\boxed{0}$ - $\boxed{9}$ keys. The parameter xxxx is the gravity acceleration.

$\boxed{\text{ENTER}}$ key .. The key to store the new gravity acceleration and proceed to step 3.
$\boxed{\text{ESC}}$ key .... The key to return to $\boxed{\mathit{G\ 5EE}}$ without changing the value.

Step 3 The parameter is displayed with triangle 2. Enter the gravity acceleration of the installed location using the $\boxed{0}$ - $\boxed{9}$ keys. The parameter xxxx is the gravity acceleration.
$\boxed{\text{ENTER}}$ key .. The key to store the new gravity acceleration and proceed to step 4.
$\boxed{\text{ESC}}$ key .... The key to return to step 2 without changing the value.

Step 4 Now $\boxed{\mathit{G\ xxxx}}$ is displayed. Press the $\boxed{\text{CAL}}$ key to store the parameters. $\boxed{\mathit{[RLoFF}}$ is displayed. Proceed to step 5.
$\boxed{\mathit{[RLoFF}}$ can be displayed by pressing the $\boxed{+/-}$ key while pressing the $\boxed{\text{ON/OFF}}$ key, instead of the $\boxed{\text{CAL}}$ key.

Step 5 Press the $\boxed{\text{ON/OFF}}$ key to turn the display off.

5.5.1.   Gravity Acceleration Table

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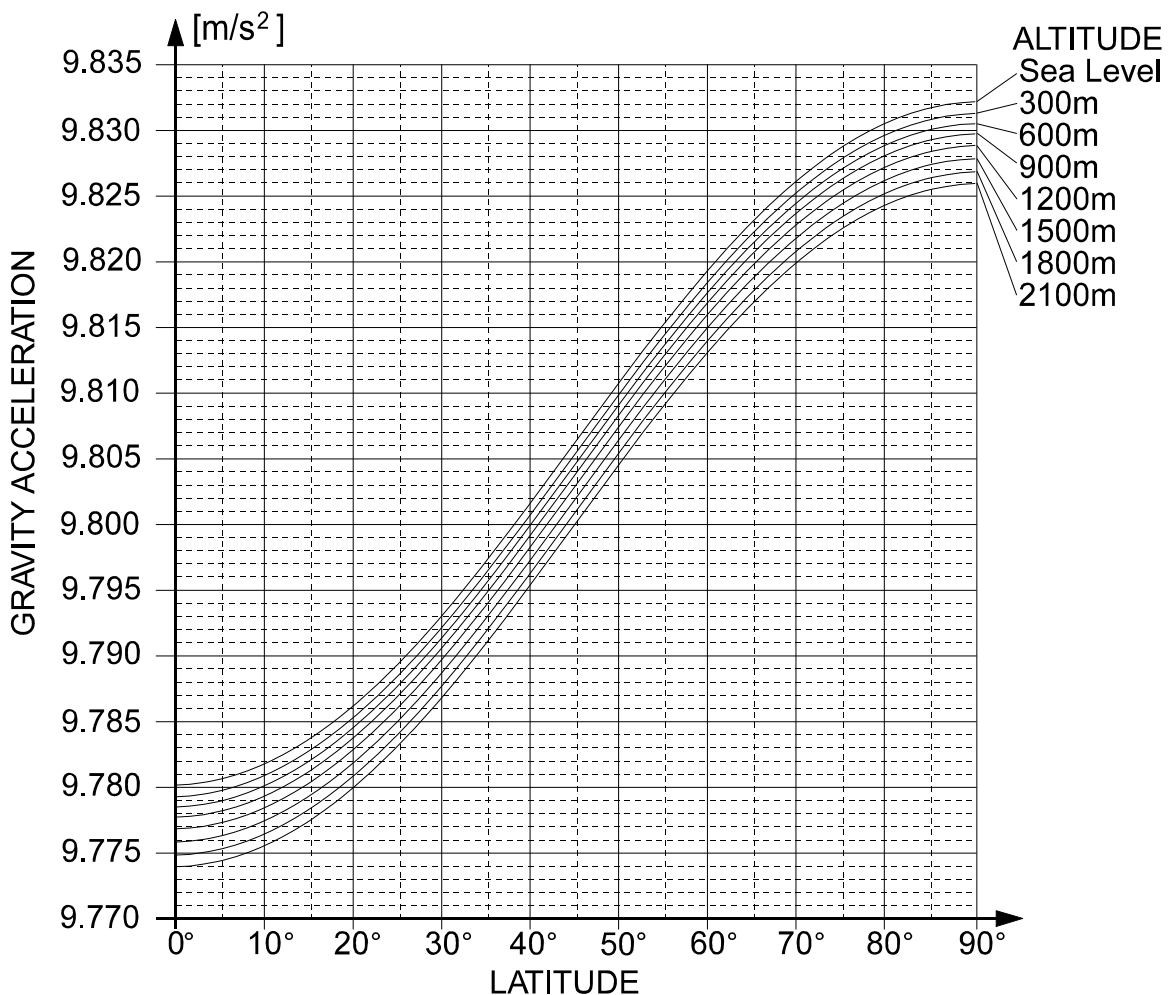
▼ 5.6. Calibration Error Code List

Exiting from a Calibration Error
[ESC] key ..... The key to return to the point where an error occurred. Retry the operation.

[ESC] key while pressing the [ON/OFF] key.
> No parameters are changed, $CRnCEL$ is displayed and the calibration mode is finished. Press the [ON/OFF] key to turn the display off.

Error Code List
> If an error has occurred during the calibration mode, the following code is displayed.

Error code	Description
Err 0	In multi-interval scale. The last division is set to maximum (d-50). Therefore the next division can not be entered.
Err 1	Resolution exceeds 40000. (Resolution = maximum capacity/ minimum division) Reduce the maximum capacity or increase the minimum division.
Err 2 Err 3	Load cell output is too large or too small at zero calibration. Check the weighing unit and load cell. Refer to "3.4. Verifying Load Cell Output and Input Sensitivity".
Err 4	The calibration mass value exceeded the maximum capacity. Use the calibration mass less than the maximum capacity.
Err 5	The selected calibration mass is smaller than the minimum division.
Err 6	The new input sensitivity is less than 0.15 µV/division. Increase the input sensitivity. Refer to "3.4. Verifying Load Cell Output and Input Sensitivity".
Err 7	When a mass is placed on the weighing unit, the load cell output becomes a negative value. Check the load cell cable connections and the direction of load cell mounting.
Err 8	The load cell output exceeds the input range before the maximum capacity. Adjust zero balance referring to "3.4. Verifying Load Cell Output and Input Sensitivity". Replace with a load cell designed for a smaller output. Or reduce the maximum capacity.
Err 9	The weight value is out of the input range at zero calibration or span calibration. Check the weighing unit and cables.
Err 12	The first weighing range is larger than second weighing range.
Err 13	An incorrect mass was selected at the digital linearization function. Select a mass of the following relation. Lnr 1 < Lnr 2 < Lnr 3.
G Err	An unacceptable value was selected in the gravity acceleration function.

6. Functions

There are two parameters lists, one for the F-functions and one for the CF-functions. These functions control the indicator. The parameters of each function are stored in non-volatile memory, and are not lost even if power is turned off.

F-functions: These parameters can always be changed and are used for internal settings.

CF-functions: If you accept a certified approval of the weighing instruments, the CAL cover (rear panel) must be sealed. In this case, the parameters of the CF-function can not be changed.

6.1. Changing the Function Settings

To enter the function setting mode, do either of the following.
1. When the display is off, press the ON/OFF key while pressing the +/- key.
2. When in the weighing mode, press both the +/- and ON/OFF keys at the same time.

In the function setting mode, F00 will be displayed.

Selecting an Item

Step 1   Select an item using the 0 - 9 keys.

ENTER key   The key to display a parameter of the selected item.
Proceed to step 2.

ESC key   To finish the function setting mode and enter the weighing mode.

CAL key   The key to switch between F-functions and CF-functions.

Selecting a parameter

Step 2   Select a parameter using the 0 - 9 keys.

ENTER key   The key to store a parameter and return to step 1.

ESC key   The key to return step 1 without changing the parameter.

CLEAR key   The key to restore the display to the initial setting.(Type1)
Change sub item.(Type2, Type3)
Type2 and Type3 are indicated in the parameter table.
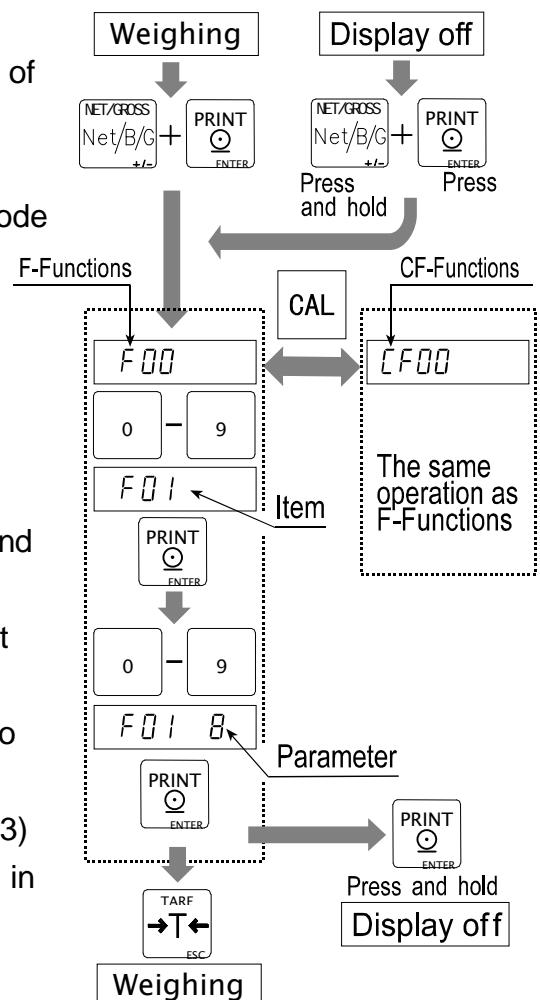
Exiting from the Function Setting Mode

Press the ESC key to proceed to the weighing mode when an item number is displayed.

⬇ 6.2. F-Functions

Weighing Conditions (Digital Filter, Zero Tracking and Stability)

Item	Parameter		Description
_F00_ Filter Motion / Averaging time	_0_	2 d/ 1.6s	If weak filter is set, the response will be fast, but will be more sensitive to external influences such as vibration.
	_1_	4 d/ 1.6s	
	_2_	8 d/ 1.6s	
	_3_	16 d/ 1.6s	
	_4_	32 d/ 1.6s	
	_5_	64 d/ 1.6s	
	_6_	128 d/ 1.6s	
	_7_	2 d/ 3.2s	
	*_8_	4 d/ 3.2s	
	_9_	8 d/ 3.2s	
	_10_	16 d/ 3.2s	
	_11_	32 d/ 3.2s	
	_12_	64 d/ 3.2s	
	_13_	128 d/ 3.2s	
_F01_ Zero tracking	_0_	OFF	This function traces the weight value drifting around the zero point slowly, displayed as zero. If a strong parameter is set, a very small zero drift may be not detected. If _CF00_ is _1_, then only _0_ or _1_ can be selected for _F01_. (Initial setting is _1_)
	_1_	0.5 d/ 1s	
	_2_	1.0 d/ 1s	
	_3_	1.5 d/ 1s	
	_4_	2.0 d/ 1s	
	_5_	2.5 d/ 1s	
	_6_	0.5 d/ 2s	
	_7_	1.0 d/ 2s	
	*_8_	1.5 d/ 2s	
	_9_	2.0 d/ 2s	
	_10_	2.5 d/ 2s	
_F02_ STABLE mark Motion detection condition	_0_	No motion detection	The function to set the condition of judgment whether a weight value is unstable or stable. The ZERO key and TARE key are active in the stable state. If these keys need to be active in the unstable state, select _1_ for _CF04_. If _CF00_ is _1_, then only _6_ or _7_ can be selected for _F02_. (Initial setting is _6_.)
	_1_	0.5 d/ 0.5s	
	_2_	1.0 d/ 0.5s	
	_3_	2.0 d/ 0.5s	
	_4_	3.0 d/ 0.5s	
	_5_	4.0 d/ 0.5s	
	_6_	0.5 d/ 1s	
	_7_	1.0 d/ 1s	
	*_8_	2.0 d/ 1s	
	_9_	3.0 d/ 1s	
	_10_	4.0 d/ 1s	
_F03_ Auto Printing/Auto accumulation timing	_0_	1 (STABLE on)	Set the number of times the STABLE mark turns on in succession, before output/print out. If _CF00_ is _1_, then only _2_ or _3_ can be selected for _F03_.
	_1_	Twice in succession	
	*_2_	Three times	
	_3_	Four times	

d: division (weighing interval) of first range. s: second. *: Initial settings.

Display and Other General Functions

Item	Parameter		Description
F04 Display update rate	* 0	5 times/s	The selection in the unstable
	1	10 times/s	condition.

F05 [Type2]
Buzzer
	1 x	Key click (ON/OFF)	Left: Item, select using the ZERO
			     key
			Right: Parameter, select using the
			     0 - 5 keys

	2 x	LoLo / Zero band	
	3 x	LO	
	4 x	OK	0: OFF 1: Continuous
	5 x	HI	2: 4 times/s 3: 2 times/s
	6 x	HiHi / Batch finish / Full	4: 1 time/s 5: 1 time/2s Initial value is 11, others x0.
F06 Device ID (Address)	00 to 99	Command address or Device ID	Initial setting is 00.
F07 Counting function	* 0	Disable	
	1	Enable	

*:   Initial settings.   s: second.

Key Switch

Item	Parameter		Description

F 12 [Type2]
Disabling key
switches
	2 0		Left: Key
			Right: 0 Enable
			         1 Disable
			
			ZERO key to select a key
			0, 1 key to select
			        Enable/Disable
			
			When F 13, F 14 and F 15 are set to
			11 and the terminal is connected
			to the common, all keys are
			enabled, regardless of the F 12
			setting.

	* 0	Enable	
	1	Disable	
	1	CODE key	
	2	SAMPLE key	
	3	SETPOINT key	
	4	PT key	
	5	TOTAL key	
	6	M+ key	
	7	START key	
	8	STOP key	
	9	FEED key	
	A	MODE key	
	b	ZERO key	
	C	TARE key	
	d	NET/GROSS key	
	E	PRINT key	
	F	ZERO+TARE = CAL	

*:   Initial settings.

External Input

Item	Parameter	Description	
F 13 EXT1 Function selection of external input	* 0	Not used (No function)	
	1	ZERO key	
	2	TARE key	
	3	NET/GROSS key	
	4	ON/OFF key	
	5	PRINT key, ENTER key	
	6	FEED key	
	7	Serial data output (Format 1)	
	8	Serial data output (Format 2)	
	9	Accumulation (M+)	
	10	Start batching	
	11	Stop batching	
	12	"Over" signal, Gross over and display data out when ON	
	13	NET weight display when shorting the terminal.	
	14	Accumulated data display when shorting the terminal.	
	15	Execute comparison when shorting the terminal.	
	16	Display by the second unit when shorting the terminal.	
	17	All keys are enabled when shorting the terminal. (Ignores the F 12 setting temporarily)	
	18	Inhibit memory code reading when shorting the terminal.	
	19	Start averaging to hold	
	20	Release holding data	
F 14 EXT2	0 to 17, 19 and 20	Same as F 13	
	18	Code Memory (BCD 1)	
F 15 EXT3	0 to 17, 19 and 20	Same as F 13	
	18	Cord Memory (BCD 2)	

*: Initial settings.

Accumulation

Item	Parameter		Description	
F 20 [Type2] Accumulation Mode	10 11	Do not add (0) / Add (1)	Left: Sub item, select using the ZERO key Right: Setting, select using the 0 , 1 keys Initial settings: 10, 21, 31, 41	
	20 21	Manual (0) / Auto (1)		
	30 31	+ Only (0) / +/- (1)		
	40 41	OK only (0) /All data (1)		
F 21 Inhibit region for accumulation	0	Add data anytime	The selection of the inhibit region for accumulation. Do not set F 21 to 0 when Auto accumulation (F20=21).	
	* 1	Above ±5 d		
	2	Above ±10 d		
	3	Above ±20 d		
	4	Above ±50 d		

d: division (weighing interval) of first range.   *:   Initial settings.

Comparator

Item	Parameter	Description	
F22 Comparator function	* *0*	Not used	
	1	Upper/lower limit comparison (2 limits setting)	
	2	Upper/lower limit comparison (Target and allowance)	
	3	Upper/lower limit comparison (Target and % allowance)	
	4	HH/Hi/OK/Lo/LL comparison (4 limits setting)	
	5	HH/Hi/OK/Lo/LL comparison (Target and allowance)	
	6	HH/Hi/OK/Lo/LL comparison (Target and % allowance)	
	7	Check weighing 1	
	8	Check weighing 2	
	9	Check weighing 3	
	10	Simple batch 1	
	11	Simple batch 2	
	12	Simple batch 3 (Loss in weight)	
F23 (*F22*=*1* to *6*) [Type2] Validation of comparison	*10* *11*	Includes zero band(1)	Initial settings are *11*,*21*,*31* and *40*.
	20 *21*	Includes minus(1)	
	30 *31*	Stable(0) /All of the time(1)	
	40 *41*	All of the time(0)/Start, stop(1)	
F23 (*F22*=*10* to *12*) [Type2] Sub function for batch weighing	*10* *11*	Tare when start(1)	Initial settings are *11*,*21*,*31* and *40*.
	20 *21*	Stop after Full by key(0)/Auto(1)	
	30 *31*	Over/Under judgment: After dribble flow(0) /Batch finish(1)	
	40 *41*	No function	
F24 Relay output selection	* *0*	Over	Effective when *F22*=*7*,*9*, *10* or *12*.
	1	Under	
	2	Finish (*F22*=*10*) / Full (*F22*=*9*, *12*)	*F22*=*9*, *10*, *12*
F25 Batch finish output time	*0.0* to *9.9*	Relay on time by 0.1 second step (00 : continuous to zero band)	Initial setting is *0.0*.
F26 Zero band	-*999999* to *999999*		Initial setting is *0*.

  *:   Initial settings.

Hold

Item	Parameter	Description	
F27 Hold mode	* *0*	Not hold (Hold function is off)	
	1	Manual hold	
	2	Auto hold	
	3	Manual and Auto hold	
F28 Averaging time	*0.0* to *9.9*	Averaging time by 0.1second step (*00* : hold at start)	Initial setting is *0.0*.

  *:   Initial settings.

Data Output

Item	Parameter	Description	
F30 Data output	* 0	No data output	
	1	Analog output	Set F31, 32, 33
	2	Serial output	RS-232C,
	3	Serial output (Zero suppressing)	RS-422/485

*: Initial settings.

Analog Output

Item	Parameter	Description	
F31 Output data	* 0	Displayed data	
	1	Gross data	
	2	Net data	
F32 Weight value at 4mA output	-999999 to 999999 (Initial setting is 0)		Polarity is changed by pressing the +/- key.
F33 Weight value at 20mA output	-999999 to 999999 (Initial setting is 10000)		

*: Initial settings.

Serial Data Format

Item	Parameter	Description	
F34 [Type3] Serial data format 1 Initial value 19, 2E, 3A 4F E50	x 0	Terminator	Left 3 digits: order of output (1-999), select using the ZERO key
	x 1	Device ID (selected at F06)	
	x 2	Code memory number	
	x 3	Data number *	
	x 4	Result of comparison	Right 1 digit: output data, select using the 0 - 9 , A - F keys
	x 5	Date	
	x 6	Time	
	x 7	Accumulated data	
	x 8	Accumulation count	
F35 [Type3] Serial data format 2 Initial value 17 2F E30	x 9	Stable / Over	"Exxx" indicates the end of data to output
	x A	Displayed weight	
	x b	Gross weight	
	x C	Net weight	
	x d	Tare weight	NET/GROSS key: Expand or shorten output data length
	x E	Weight type (G /N / T, refer to CF06)	
	x F	Weight unit (Refer to CF07)	

1 The comma of the parameter display indicates that the comma (F46=0, semi-colon for F46=1) is output after the data. To turn this mark on and off, press the 9 key while pressing NET/GROSS key.
   Output of the initial setting of F34(19, 2E, 3A 4F E50) is like "ST,GR,+12345.6kg".

2 The data number *(parameter 3) increments automatically with each serial data output from 1 to 99999 (the next of 99999 is 1). The starting number can be set using the keys.

Current Loop Output

Item	Parameter	Description
_F36_ Output data	* _0_	Displayed data
	_1_	Gross data
	_2_	Net data
	_3_	Tare data
	_4_	Gross data / Net data / Tare data
_F37_ Output mode	_0_	Stream mode
	_1_	Manual mode
	_2_	Auto print mode(+)
	_3_	Auto print mode(+/-)
	_4_	When accumulation, automatically output
	* _5_	Not output
_F38_ Delay for _F36_=_4_	* _0_	No delay
	_1_	2.0 seconds (No delay when _F37_=_0_)
_F39_ Baud rate	_0_	600 bps
	_1_	1200 bps
	* _2_	2400 bps

    *:   Initial settings.   bps: bit per second.

Serial Interface

Item	Parameter	Description			
F40 Output mode	* 0	Stream mode, command is not acceptable			
	1	Manual mode, command is effective			
	2	Auto print mode(+), command is effective			
	3	Auto print mode(+/-), command is effective			
	4	When accumulation, automatically output			
	5	Command mode (output by command only)			
F41 Accumulated data output at accumulated data display	0	No output			
	* 1	Manual, Fixed format			
	2	Auto, Fixed format			
	3	Manual, Format 1 (F34)			
	4	Auto, Format 1 (F34)			
	5	Manual, Format 2 (F35)			
	6	Auto, Format 2 (F35)			
F42 Delay for continual data	* 0	No delay			
	1	0.5 second			
	2	1.0 second			
	3	1.5 seconds			
	4	2.0 seconds			
F43 Command address	* 0	Not used			
	1	Used (selected at F06)			
F44 Time out	* 0	Approx. 1 second			
	1	No limitation			
F45 Terminator	* 0	CR, LF (0Dh, 0Ah)			
	1	CR (0Dh)			
F46 D.P. / Delimitter Serial Interface, Printer and Current Loop output		Serial Interface and Printer		Current Loop output	
		D.P.	Delimitter	D.P.	Delimitter
	* 0	Dot (.)	Comma (,)	Dot (.)	Comma (,)
	1	Comma (,)	Semicolon (;)	Dot (.)	Comma (,)
	2	Dot (.)	Comma (,)	Comma (,)	Semicolon (;)
	3	Comma (,)	Semicolon (;)	Comma (,)	Semicolon (;)
F47 Baud rate	0	600 bps			
	1	1200 bps			
	* 2	2400 bps			
	3	4800 bps			
	4	9600 bps			
F48 Data bit, parity	* 0	Data 7bits, Even parity			
	1	Data 7bits, Odd parity			
	2	Data 8bits, Non parity			

*:   Initial settings.   bps: bit per second.

Calendar / Clock Function

Item	Parameter	Description	
F50 Time display	*0	12 hours (00 to 11, AM / PM)	
	1	24 hours (00 to 23)	
F51 Date format	*0	YY/MM/DD	
	1	MM/DD/YY	
	2	DD/MM/YY	
F52 Difference between Christian year	00 to 99	(Display/output year) – (Christian year)	2 digits Initial setting is 0.
F53 Year format	*0	2 digits	
	1	4 digits (Numeric)	First 2 digits specified at F54.
	2	4 digits (characters+ Numeric)	Format specified at F54.
F54 First 2 digits of year	00 to 99	2-digit number (F53= 1) or alphabet, blank or dot (F53=2)	Effective when F53= 1 or 2

    *:   Initial settings.

Printer Function

Item	Parameter	Description	
F60 Print Mode (Format 1)	0	Do not print	
	*1	Manual	
	2	Auto print (+)	
	3	Auto print (+/-)	
	4	When accumulation, automatically print	
	5	(Reserved)	no function
F61 Print accumulated data	0	Do not print	
	1	Manual, format (extended)1	
	2	Auto, format (extended)1	
	*3	Manual, format (extended)2	
	4	Auto, format (extended)2	
F62 Repeat printing	*00 to 99	0 (once)	Identical contents printed repeatedly
		9 (ten times)	Left : format 2 Right : format 1
F63 Number of line feed before printing	*00 to 99	0 line	Left : format 2 Right : format 1
		9 lines	
F64 Number of line feed after printing	*00 to 99	0 line	Left : format 2 Right : format 1
		9 lines	
F65 Print direction	*0	Normal	
	1	Inverted	

    *:   Initial settings.

Print Format

Item	Parameter	Description	
_F 70_ [Type3] Print Format 1	x _0_	No print	_00_ : Line feed only
	x _1_	Device number ID#	Selected at _F06_
	x _2_	Code memory number CD:x	
	x _3_	Data number No.xxxxx	
Initial setting E1 0A	x _4_	Judged result	HH/H/OK/L/LL (2 digits)
	x _5_	Date 11/11/11	YMD order selected at _F5 1_
	x _6_	Time hh:mm:ss (AM or PM)	
	x _7_	Accumulated data	
_F 7 1_ [Type3] Print format 2	x _A_	Displayed value G or N xxxx uu	Effective only with _0A_,_4A_
	x _b_	Gross weight G xxxx uu	Effective only with _0b_,_4b_
	x _C_	Net weight N xxxx uu	Effective only with _0c_,_4c_
Initial setting 1 80, E2 70	x _d_	Tare Weight	Effective only with _0d_,_4d_
	_0_ x	No print	
	_1_ x	Device number ID#	Not effective with _1A_ – _1d_
10^2=Printing order select using the ZERO key	_2_ x	Code memory number CD:x	Not effective with _2A_ – _2d_
	_3_ x	Data number No.xxxxx	Not effective with _3A_ – _3d_
	_4_ x	Judged result	HH/H/OK/L/LL (2 digits)
10^1=Left side	_5_ x	Date 11/11/11	Effective only with _50_ to _54_ and 5_6_
10^0=Right side select using the 0 - 9 , A - F keys	_6_ x	Time hh:mm:ss (AM or PM)	Effective only with _60_ to _64_
	_7 0_	Accumulated data	Total xxxx uu (2 lines)
	_8 0_	Accumulation count xxx	
_E_ xxx=End of line mark	_9 1_	+	
	_9 2_	-	
	_9 3_	*	
	_9 4_	/	Print specified letters in one line (16 digits).
NET/GROSS key: Expand or shorten output data length	_9 5_	=	
	_9 6_	.	
	_9 7_	#	
	_9 A_	Signature	'Signature' and 3 line feed.

- ❑ 2 data sets can be printed in one line, the data printed at left side or right side. Some data occupy one line (weight data, accumulated data, 4-digit year,etc.).
- ❑ The printed data can include some symbols or characters with the numerical data.
- ❑ A blank line can be set with the parameter "_00_". At the beginning or ending of the print data, line feed can be set by _F63_ or _F64_ separately using format 1 and 2.
- ❑ The data number automatically increases by one after print out of the data group.
- ❑ The first line is placed at the bottom of the line with the inverted print mode (_F65_= _1_).

⬇ 6.3. CF-Functions

Item	Parameter	Description
`CF00` Zero tracking width, motion detection condition	*`0`	No limitation
	`1`	Use limitation at `F01`, `F02`, `F03`, `F27` and `F28`.
`CF01` Zero range (by pressing the ZERO key)	*`0`	±2% of CAP, Tare limit is 100 % CAP
	`1`	±10% of CAP, Tare limit is 100 % CAP
	`2`	±3% of CAP, Tare limit is 50 % CAP
	`3`	±4% of CAP, Tare limit is 50 % CAP
`CF02` Power on zero range (Reference: CAL 0)	`0`	Not to zero when turning the display on.
	*`1`	±10% of CAP
	`2`	± 3% of CAP
	`3`	± 4% of CAP
`CF03` Zero tracking	`0`	Gross when displaying gross.
	`1`	Gross
	*`2`	Gross or Net when displaying net.
`CF04` TARE, ZERO in motion / TARE at negative gross value		TARE, ZERO in motion / TARE at negative gross
	*`0`	Not accepted / Not accepted
	`1`	Execute / Not accepted
	`2`	Not accepted / Execute
	`3`	Execute / Execute
`CF05` Output overload and unstable data	*`0`	Not to output unstable or overload data. Effective in key mode.
	`1`	To output data always.
`CF06` Header 2		GROSS / NET / TARE / Preset TARE
	*`0`	GR / NT / TR / TR
	`1`	GR / NT / TR / PT
	`2`	G_ / N_ / T_ / PT (_: Space 20h)
`CF07` Number of unit digits	*`0`	Two digits — Serial output data
	`1`	Three digits — Serial output data
`CF08` Accumulation function	*`0`	Not used (Ineffective)
	`1`	Used (Effective)
`CF09` Preset Tare (PT)	*`0`	Used (Effective)
	`1`	Not used (Ineffective)

CAP : Maximum capacity   *: Initial settings

Power on ZERO (CF02)

`CF02=0`   After power on, the weight display starts immediately.

`CF02=1,2,3`   When the zero range is exceeded at power on, | ------ | is displayed.
Press the ESC key to start the weight display.

⬇ 7. Tare

- The function is used to display a net value with the container weight subtracted from the total weight, if you place an object into a container to weigh it.
- Using a serial interface such as the RS-232C, you can do this from the external equipment.

Caution
- **When turning the display off with $CF02= 1, 2$ or 3, the tare data is cleared.**
- **When turning the power off, the tare data is cleared.**

⬇ 7.1. Weighing Tare

Operation   Place the tare on the weighing unit. Wait for the STABLE mark to turn on and press the TARE key to store the tare weight. The display changes to net.

Caution
- **When the gross value is zero or negative, tare can not be used (with $CF04=0, 1$). To enable tare at zero or a negative gross value, specify at $CF04$.**

⬇ 7.2. Digital Input (Preset Tare)

Caution
- **The input value is rounded off to the unit of division (weighing interval).**
- **In the case of $CF02= 1, 2$ or 3 (power-on zero), the displayed value will be zeroed when turning the display on.**
- **When using a multi-interval scale, the usable input range is the first range.**
- **In the case of $CF09= 1$ (To inhibit preset tare), preset tare can not be used.**
- **Preset tare is stored as one of the Code Memory data. Refer "9. Code Memory".**
- **Preset tare value can be set via the serial interface.**

Step 1   Press the PT key to display the stored tare value and the triangle ▼ mark blinking. When the tare is cleared or is not used, the value is zero.

Step 2   Enter a new tare value using the 0 - 9 keys.

ENTER key   The key to store a new tare value.
                 The triangle ▼ mark is turned on and the net is displayed.

ESC key   The key to return to the previous stage (weighing mode or code memory selection mode) without changing the stored value.

⬇ 7.3. Clearing Tare

- When pressing the TARE key while gross is zero, tare is cleared and gross is displayed.
- When zeroing with the ZERO key, tare is cleared.

8. Accumulation

This function accumulates weighing data and stores the total data and the accumulation count. The data is stored in non-volatile memory, and is not lost even if the power is turned off.

8.1. Preparation and Specifications

Set the following parameters to use the accumulation function.
- ❑ Set CF-function $CF08$ to 1 to enable the accumulation function.
- ❑ Specify the method of accumulation and data at $F20$ of the F-functions.
- ❑ Specify the inhibit region for accumulation at $F21$ of the F-functions.

Selection of Accumulation Mode, F20 of the F-functions
- ❑ There are two methods of accumulation; manual accumulation using the M+ key and automatic accumulation.
- ❑ The data to accumulate can be selected from "positive data only" or "both polarity data".
- ❑ The data to accumulate can be selected from "result of comparison is OK only" or "all results".

Accumulation Condition, F21 of the F-functions
- ❑ In the case of manual accumulation mode, press the M+ key to accumulate weight data when the STABLE mark is displayed.
- ❑ Data can be accumulated after the weight data enters the "inhibit region for output". When turning the display on, the accumulation mode takes the same action.

Inhibit region for accumulation	$F21$	Description
Add data anytime	$F21$ 0	Stable data can be used anytime
Above ±5 d	$F21$ 1	Initial setting
Above ±10 d	$F21$ 2	
Above ±20 d	$F21$ 3	
Above ±50 d	$F21$ 4	

Caution   ❑ **Do not set $F21$ to 0 for the automatic accumulation mode**
             ❑ **If $F21$ is set to 0, the same data may be added two times or more.**

Limitation of Accumulation Count and Total
- ❑ The limitation of accumulation count is 999999.
  The limitation of total is 999999 ignoring the decimal point.
- ❑ If exceeding these limitations, the data is not accumulated.
  Example: When the decimal point is set to "0.0", the limitation is "99999.9".

Action of Accumulation

- When accumulating data, the display blinks once.
  If the accumulated data is stored, the M+ mark is displayed.

Caution □ **This function can not accumulate data with a different unit. Specify a unit before use.**

Display of Accumulated Data

- With $CF08 = 1$ (Effective accumulation function), press the TOTAL key. After $totAL$ appears, the total data is displayed with the M+ mark blinking.
  Pressing the TOTAL key alternatively displays the accumulated data and the accumulation count. Press the ESC key to return to the weighing mode.
- The total data can be output. Refer to "Output of Accumulated Data".

Undoing the Accumulated Data

- The last weight data can be deduced from the accumulated data unless new data has been accumulated.

Step 1 Press the TOTAL key to display $totAL$ and the accumulated data.

Step 2 Press and hold the +/- key for more than 3 seconds. The display blinks once and the data accumulated before accumulating the last weight data is displayed.

Caution □ **External input can not be used.**

Clearing the Accumulated Data

Step 1 Press the TOTAL key to display $totAL$ and the accumulated data.

Step 2 Press and hold the ZERO key for more than 3 seconds. The display blinks once and the accumulated data is cleared.

Caution □ **External input can not be used.**

Initializing the Data Number and Clearing the Accumulated Data at the same time

- When the data number is included with the data of the serial data output or the printer, initializing the data number and clearing the accumulated data can be done at same time.
- If using both serial output and printer data number, all data numbers are initialized by this operation.

Step 1 Press TOTAL key to display $totAL$ and the accumulated data.

Step 2 Press and hold the ZERO and +/- keys at the same time for more than 3 seconds. The display blinks once and the accumulated data is cleared. And the data number is initialized (1).

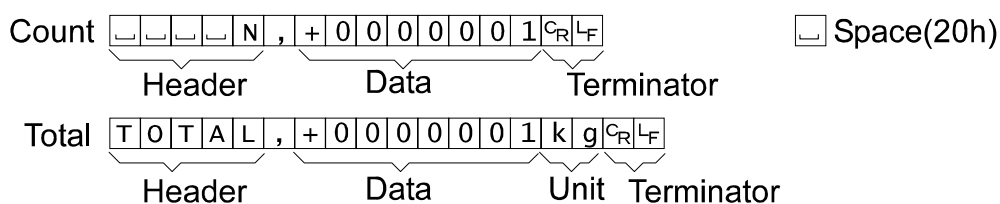**Caution** □ **External input can not be used.**

Output of Accumulated Data

- Accumulated data can be output to the serial interface.
- Output by manual or automatic, and output data format is selected at $F41$ of the F-function setting.

$F41$	Parameter	Manual/Automatic	Format
Accumulated data output at accumulated data display	0	No output	
	* 1	Manual	Fixed format
	2	Automatic	
	3	Manual	Format 1(selected at $F34$)
	4	Automatic	
	5	Manual	Format 2(selected at $F35$)
	6	Automatic	

Step 1   Press the TOTAL key to display $total$ and the accumulated data.

Step 2   If automatic output is selected, the data is output once at that timing.

Step 3   If manual output, press the PRINT key while the accumulated data is displayed, to output data.

Fixed data format:

Count | ␣ | ␣ | ␣ | ␣ | N | , | + | 0 | 0 | 0 | 0 | 0 | 0 | 1 |C_R|L_F| ␣ Space(20h)

       Header   Data   Terminator

Total | T | O | T | A | L | , | + | 0 | 0 | 0 | 0 | 0 | 0 | 1 | k | g |C_R|L_F|

       Header   Data   Unit   Terminator

Print of Accumulated Data

- The accumulated data can be printed out by the optional printer.
- Print out by manual or automatic, and output print format is selected at $F61$ of the F-function setting.

$F61$	Parameter	Manual/Automatic	Format
Print accumulated data	0	Do not print	
	1	Manual	Format 1(selected at $F70$)
	2	Automatic	
	* 3	Manual	Format 2(selected at $F71$)
	4	Automatic	

Step 1   Press the TOTAL key to display $total$ and the accumulated data.

Step 2   If automatic print is selected, the data is printed out once at that timing.

Step 3   If manual print, pressing the PRINT key while the accumulated data is displayed, to print out the data.

9. Code Memory

❑ This indicator has four Code memories (1 through 4). Each Code memory stores a set of setpoints, preset tare and the unit weight for piece counting.

❑ The data is stored in non-volatile memory, and is not lost even if power is turned off.

❑ Memory number 0 is a temporary memory and the data is lost when power is turned off.

❑ The active code memory number can be changed by key switch, external control input, or a command via the serial interface.

❑ The data set can be copied from one code memory to another code memory.

9.1. Using Code Memory

Step 1   Press the CODE key in the weighing mode. $\boxed{Cd\ x}$ is displayed with the current code memory number x blinking. Use the following keys:

0 - 4 key .... The key to input the code memory number.

CLEAR key.............. The key to reset the code memory number (0).

+/- key..................... The key to copy the data set to another code memory number. Proceed to step 3.

ESC key.................. The key to return to the weighing display without changing the code memory number.

ENTER key .... The key to set the code memory number. Proceed to step 2.

Step 2   The code memory number is set and the blinking stops. Use the following keys:

SETPOINT key .... The key to set the comparator value. Refer to "10. Comparison".

PT key .... The key to set the preset tare data. Refer "7.2. Digital Input".

ESC key.................. The key to return to step 1.

ENTER key .... The key to store the selected code memory number's data and return to the weighing mode.

Step 3 $\boxed{CoPY}$ is displayed for 2 seconds and then $\boxed{C\ x\text{-}y}$ is displayed with "y" blinking. Here, "x" is the code memory number specified at step 1 and "y" is the destination code memory number. Use the following keys:

0 - 4 key .... The key to input the destination code memory number.

ESC key.................. The key to return to step 1.

ENTER key .... The key to copy number x's data to the destination "y" and to return to step 1.

Changing the Code Memory Number by External Input

❑ The code memory number can be changed by external input from OP-05 or OP-08.

❑ Set $F\ 14$ and $F\ 15$ to 18. (OP-08 has only one input; set $F\ 15$)

❑ $F\ 13 = 18$: Inhibit reading EXT.2 and EXT.3 to prevent unintentional reading when switching the codes.

EXT.2 ($F\ 14$)	EXT.3 ($F\ 15$)	Code Memory number
ON	ON	1
OFF	ON	2
ON	OFF	3
OFF	OFF	4

10. Comparison

- This function has the "upper / lower comparison", the "5-stage (HiHi / Hi / OK / Lo / LoLo) comparison", the "setpoint comparison" and the "simple batch". They compare the weight data with preset parameters and can output the result of the comparison to the display and buzzer, also to the relay-outputs of OP-03, OP-05 and OP-08.
- Set the F-functions *F22* and *F23* to use the "upper / lower comparison", the "5-stage (HiHi / Hi / OK / Lo / LoLo) comparison" (these two comparison methods will be combined and hereafter be called the "Weight check mode"), and *F22* through *F26* to use the "setpoint comparison" and the "simple batch".
- Data is stored in non-volatile memory and is not lost even if power is turned off.
- Code memory can be selected by key switch, external control input, or a command via the serial interface. Refer to "16.3. Command Format".

10.1. Weight Check Mode

- This function compares the weight data with the upper and lower limit values (upper/lower limit comparison) or four limit values of HiHi, Hi, Lo and LoLo (5-stage comparison), and displays, sounds the buzzer and outputs the results to the three relays of HI, OK and LO. Use this comparison when judging whether a weight is proper.
- Set the F-function *F22* to *1*, *2* or *3* to use upper/ lower limit comparison and *F22* to *4*, *5* or *6* to use 5-stage comparison.
- Select a parameter of the F-function *F23* for the comparison condition.
- Set the F-function *F26* (zero band) if *F23* is set to *10* (not to compare in the zero band).
- Specify the upper and lower limit / HiHi, Hi, Lo, LoLo limit values.
- When entering the limit value(s), it is not necessary to enter the F-function *F22* and *F23* again unless comparison conditions are changed.
- There are 3 type of setting values for each comparison.
    (1) Set the limit value (upper and lower limit / HiHi, Hi, Lo, LoLo limit).
    (2) Set the Target value and an acceptable tolerance (upper and lower) in weight. The limit value is calculated automatically.
    (3) Set the Target value and an acceptable tolerance (upper and lower) in percentage of the target weight. The limit value is calculated automatically.
  Example.   Target = 50 kg,   Upper limit = 51 kg,   Lower limit = 48 kg
    (1) Hi (Upper limit): 51 (kg), Lo (Lower limit): 48 (kg)
    (2) TG (Target):   50 (kg), Hi (Upper acceptable tolerance): 1 (kg),
        Lo (Lower acceptable tolerance): 2 (kg) not a negative value
    (3) TG (Target): 50 (kg), Hi (Upper acceptable tolerance): 2 (% of Target), Lo (Lower acceptable tolerance): 4 (% of Target) not a negative value

10.1.1. Condition Formula for Comparison

Comparison is performed based on the following formula.

Upper/lower comparison

Judge	Condition Formula	Display	Output
HI	Upper limit (Hi limit) value < Displayed value	HI	HI
OK	Lower limit value $\leq$ Displayed value $\leq$ Upper limit value	OK	OK
LO	Displayed value < Lower limit (Lo limit) value	LO	LO

5-stage comparison

Judge	Condition Formula	Display	Output
HiHi	HiHi limit value < Displayed value	HI, ▼2	HI
HI	Upper limit (Hi limit) value < Displayed value	HI	HI, OK
OK	Lower limit value $\leq$ Displayed value $\leq$ Upper limit value	OK	OK
LO	Displayed value < Lower limit (Lo limit) value	LO	LO, OK
LoLo	Displayed value < LoLo limit value	LO,▼3	LO

❑ The decimal point is ignored. Example: If the upper limit value is 10.0, enter 100.

❑ These parameters are stored in non-volatile memory, and are not lost even if power is turned off (except code 0 memory).

❑ When the displayed value becomes an overload (positive over), HI (over) is output. When the displayed value becomes an underload (negative over), LO (under) is output.

❑ This function compares the Hi / HiHi limit value first.

❑ This function does not check the relationship between the upper and lower limit values.

10.1.2. Setting the Upper/Lower Limit Values

Step 1   By pressing the SETPOINT key, the selected code memory number is displayed and the first comparison class term (ex. Hi, TG etc.) is blinking.

Step 2   Select the comparison class using the following keys:
SETPOINT key .... The key to select a comparison class.
ESC key .... The key to return to the previous stage (weighing mode or code memory number selection mode).
ENTER key .... The key to proceed to step 3.

Step 3   Set the setpoint values using the following keys:
0 - 9 key .... The key to enter a value.
ESC key .... The key to return to step 2 without changing the set value.
ENTER key .... The key to store the value and return to step 2.

Setting Order and Display for Weight Check Mode

| F22	MODE	Display	1	2	3	4	5
1	Upper Lower 1	Setpoint	Upper	Lower			
		Class	Hi	Lo			
		Comparator	HI	LO			
2	Upper Lower 2	Setpoint	Target	Upper	Lower		
		Class	TG	Hi	Lo		
		Comparator	OK	HI	LO		
3	Upper Lower 3	Setpoint	Target	Upper	Lower		
		Class	TG	Hi	Lo		
		Comparator	OK	HI	LO		
		Unit		%	%		
4	5-stage 1	Setpoint	HiHi	Hi	Lo	LoLo	
		Class	HH	Hi	Lo	LL	
		Comparator	HI	HI	LO	LO	
		Triangle	2			3	
5	5-stage 2	Setpoint	Target	HiHi	Hi	Lo	LoLo
		Class	TG	HH	Hi	Lo	LL
		Comparator	OK	HI	HI	LO	LO
		Triangle		2			3
6	5-stage 3	Setpoint	Target	HiHi	Hi	Lo	LoLo
		Class	TG	HH	Hi	Lo	LL
		Comparator	OK	HI	HI	LO	LO
		Unit		%	%	%	%
		Triangle		2			3

⏷ 10.2. Setpoint Comparison

- This function includes the weighing sequence and is used for acquiring a preset target weight.
- Four parameters of "Final", "Preliminary", "Free fall" and "Zero band" are used for the setpoint comparison.
- The result of the sequence is output to the three relays of OP-03, Op-05 or OP-08.
- It is not necessary to enter the F-function $F22$ again unless comparison conditions are changed.

10.2.1. Description of Input Parameters and Outputs

F22 = 7 (Check weighing 1)
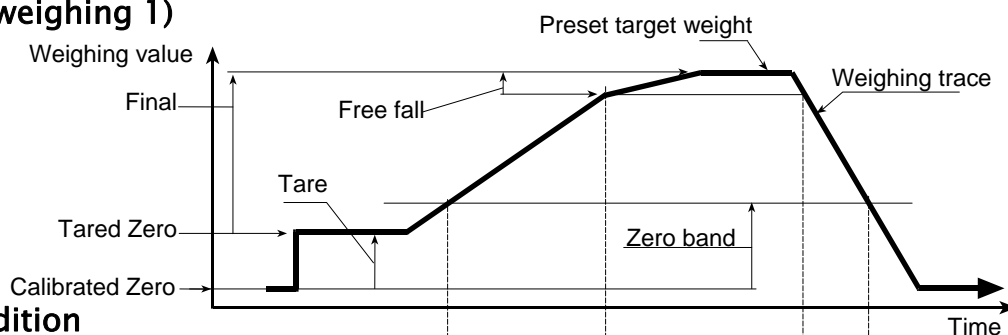
Output and Condition

Relay HI, ▼1, Net ≧ (Final - Free fall)	OFF	ON	OFF
Relay LO, ▼3, Gross < Zero band	ON	OFF	ON

Relay OK output can be changed to OVER or UNDER by setting $F24$.

Triangle ▼2 is not displayed.

OVER/UNDER is judged always and the result is output to the LED and the relay.
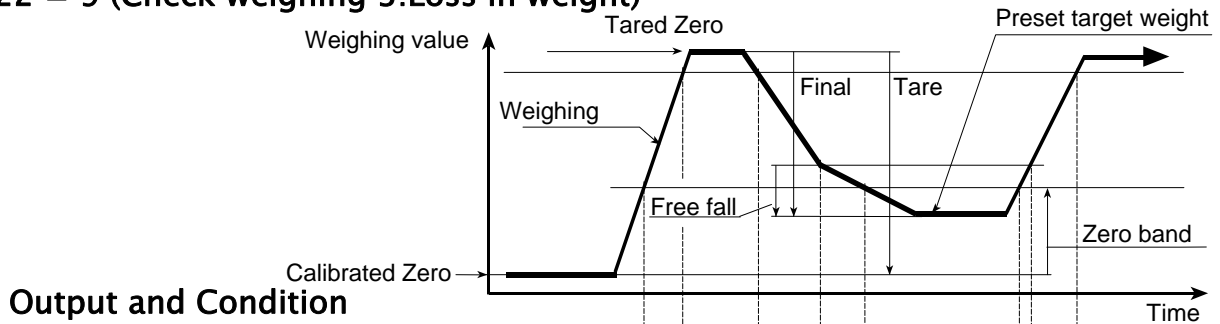
F22 = 8 (Check weighing 2)
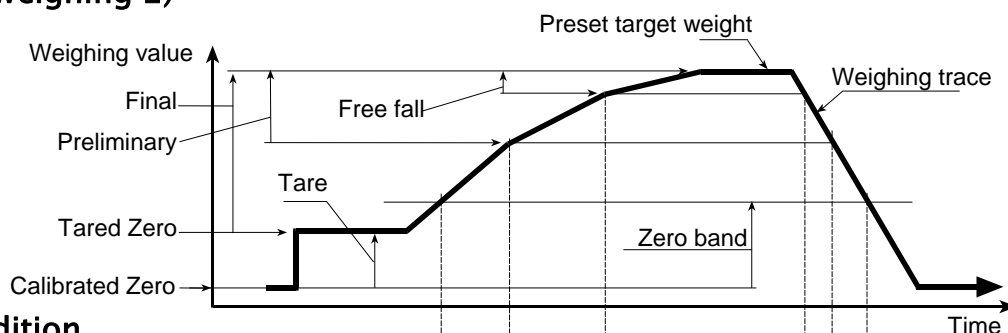
Output and Condition

Relay HI, ▼1, Net ≧ (Final - Free fall)	OFF	ON	OFF
Relay OK, ▼2, Net ≧ (Final - Preliminary)	OFF	ON	OFF
Relay LO, ▼3, Gross < Zero band	ON	OFF	ON

OVER/UNDER is judged always and the result is output to the LED but not to the relay.

F22 = 9 (Check weighing 3:Loss in weight)

Output and Condition

Relay HI, ▼1, Net $\geqq$ (Final - Free fall)		OFF		ON		OFF
Relay LO, ▼3, Gross $<$ Zero band	ON		OFF		ON	OFF
Relay OK*, ▼2, Gross $\geqq$ Full	OFF	ON		OFF		ON

*   Relay OK output can be changed to OVER or UNDER by setting $F24$.

Triangle ▼2 is displayed when Gross $\geqq$ Full, regardless of the $F24$ setting.

OVER/UNDER is judged always and the result is output to the LED and the relay.

10.2.2.   Simple Batch

The weighing sequences of simple batch ($F22=10, 11$ or 12) are similar to those of check weighing ($F22=7, 8$ or 9) respectively. The differences are listed below.

1   Basically ON/OFF of the relay and the LED are reversed.
2   No judgment other than Zero band and Full before input of the Start signal.
3   The weighing completion condition is set by $F23=2$x and it is effective after Start.
4   The outputs of Preliminary and Free fall are off from weighing completion to the next start.
5   Weighing completion can be output by setting $F24$ and $F25$.
6   The start signal can be accepted after weighing completion even if the weight is not within the zero band.
7   Over/Under output is set by $F23=3$x.

Start

Tare automatically when the Start is input if $F23=11$.

The READY mark turns off when the Start is input.

Weighing Completion

The weighing completion condition is set by $F23=2$x.

$F23=20$: Either the STOP key is pressed or the Batch stop input is on.

$F23=21$: Stable is detected after reaching Final.

Before reaching Final, the STOP key or Batch stop input forces weighing completion even if $F23=21$.

Toward the Zero band

Preliminary and Free fall output maintain the off state.

Over/Under comparison starts. If $F23=30$, judgment starts when Free fall turns on.

The judgment is not latched and the output is according to the state at the time.

The Weighing completion relay is turned on if $F24=2$. The on time is set by $F25$.

The READY mark is blinking regardless of the settings of $F24$ and $F25$.

Start may be accepted at this state.

Returns to Zero band

Over/Under and Weighing completion output is off.

The READY mark is turned on.

10.2.3.　Setting the Parameters of Setpoint Comparison

Refer to "10.1.2. Setting Upper/Lower Limit Values".

The zero band value is set at $F26$ of the F-Functions, and the value does not belong to a specific code memory, but is used commonly.

Setting Order and Display for Setpoint Comparison and Simple batch

F22	MODE	Display	1	2	3	4	5
7	Setpoint Comparison 1	Setpoint	Final	Free fall	Over	Under	
		Class	Fi	FF	Hi	Lo	
		Comparator	OK		HI	LO	
		Triangle▼		1			
8	Setpoint Comparison 2	Setpoint	Free fall	Preliminary	Over	Under	Under
		Class	Fi	FF	Pr	Hi	Lo
		Comparator	OK			HI	LO
		Triangle▼		1	2		
9	Setpoint Comparison 3	Setpoint	Final	Free fall	Full	Over	Under
		Class	Fi	FF	Fu	Hi	Lo
		Comparator	OK			HI	LO
		Triangle▼		1	2		
10	Simple Batch 1	Setpoint	Final	Free fall	Over	Under	
		Class	Fi	FF	Hi	Lo	
		Comparator	OK		HI	LO	
		Triangle▼		1			
11	Simple Batch 2	Setpoint	Final	Free fall	Preliminary	Over	Under
		Class	Fi	FF	Pr	Hi	Lo
		Comparator	OK			HI	LO
		Triangle▼		1	2		
12	Simple Batch 3	Setpoint	Final	Free fall	Full	Over	Under
		Class	Fi	FF	Fu	Hi	Lo
		Comparator	OK			HI	LO
		Triangle▼		1	2		

⬇ 11. Hold Function

- This function displays the hold weight data after averaging the weight data for a specific period.
- Useful to determine a living animal's weight.
- Averaging time can be set up to 9.9 seconds by a 0.1 second step.
- 3 methods are available to start averaging; manual start, start automatically after stable and manual / automatic start.
- Manual start is available with key switch or external input.
- Serial interface commands are also available; averaging start, releasing the hold data and outputting the hold state. Refer to "16.3.4. Commands for the Hold Function".

Caution
- **This function can not be used with $CF00=1$.**
- **Averaging can not start at a displayed value smaller than +/- 5 digits.**
- **OVER data is not included for averaging.**
- **When powered off, the hold is released automatically.**
- **No peak hold function.**

The Display and the Data Output of Hold and Average

- The weight display blinks during the averaging period.
- The output data in the averaging period is the actual weight at the time.
- The weighing unit blinks when the weight display is in the hold state.
- The output data format of the hold weight data is the same as that of the normal weight data except the header of stable state is "HD" in the response to the "RW" or "RW,n"(n=1 or 2) command.

Relations to the Other Functions

- If automatic accumulation ($F20=21$) and/or auto print ($F37=2$, 3 $F40=2$, 3) is set, accumulation and/or data output is performed after the hold data is obtained.

⬇ 11.1. Setting the Hold Functions

- $F27$ determines how to start averaging.

  $F27=1$ Manual start: Start averaging and release with key switch operation.

  $F27=2$ Automatic start: After passing the inhibit region * and detecting stable **, start averaging automatically, release when the weight returns to the inhibit region.

  $F27=3$ Both Manual start and Automatic start.

    *Inhibit region   0 +/- 5 digits

   **Stable detection   Satisfied both $F02$ and $F03$

- $F28$ determines the averaging time by 0.1second step. $F28=0$ holds the data at averaging start.
- The key switch function as the HOLD key (Average start or release holding data): Press the TOTAL key while pressing the ENTER key.
- The external input function of averaging start is 19 and hold release is 20 of $F13$, $F14$ and $F15$. The function is accepted at the off to on edge of the external input.

Conditions of Averaging and Release

The method to start/stop averaging and release the hold state depends on the $F27$.

Condition	$F27\ 1$	$F27\ 2$	$F27\ 3$
Average start in the inhibit region	No	No	No
Average start with key switch (including unstable)	Yes	No	Yes
Average start with ext. input (including unstable)	Yes	No	Yes
Average start with command (including unstable)	Yes	Yes	Yes
Average start after passing the inhibit region and stable	No	Yes	Yes
Weight is entering the inhibit region at averaging	Continue	Stop	Stop
Weight becomes over at averaging	Pending	Stop	Pending
Hold key input at averaging	Stop	Stop	Stop
Release input from external input at averaging	Stop	Stop	Stop
Release command input at averaging	Stop	Stop	Stop
Hold key input at hold	Release	Release	Release
Release input from external input at hold	Release	Release	Release
Release command input at hold	Release	Release	Release
Weight is entering the inhibit region at hold	Continue	Release	Release
Weight becomes over at hold	Continue*	Continue*	Continue*

Pending: Suspend the count up timer and do not average under the condition.

Release: Key, ext. input and command are effective at over display.

Continue*: Continue hold, but over display.

Key input and command in the hold state

Release hold and perform key function:

Keys:	TARE, ZERO, SETPOINT, TOTAL
Commands:	MT, MZ, HC

Continue hold and perform key functions

Keys:	NET/GROSS, Accumulation, Comparison start/stop
Commands:	Other commands

⬇ 12. Counting Function

This function determines the number of objects in a sample based on the unit weight. The unit weight is stored in one of the code memory data in non-volatile memory, and is not lost even if power is turned off.

⬇ 12.1. Using the Counting Function

- ❑ Preparation: Set _F07_ to _1_ in the F-Functions.
- ❑ Select a code memory number. Refer to "9.1. Using Code Memory".
- ❑ Register the unit weight. Refer to "12.2. Unit Weight Registration".
- ❑ Press the MODE key to enter the counting mode. The unit in the display changes to pcs.
- ❑ In the counting mode, TARE, ZERO, NET/GROSS and other operations are the same as that in the normal weighing mode.

⬇ 12.2. Unit Weight Registration

- ❑ There are three methods to register the unit weight. By weighing the actual samples to determine the unit weight, by digital input of the unit weight, or by command via the serial interface.
- ❑ The unit weight is one item of the code memory data. Select the code memory number and start the unit weight registration in the weight display or piece count display. The unit weight registration can not be done from the code memory number display.
- ❑ There is no counting accuracy improvement function by re-calculating the unit weight based on the actual weight.

Weigh Actual Samples

When the unit weight is unknown, prepare some samples to determine the unit weight.

Step 1   Enter the counting mode.

Step 2   Press the SAMPLE key to enter the unit weight registration mode. $\boxed{5 \quad 0}$ or $\boxed{5 \quad \text{-}}$ is displayed and unit pcs blinks. The left side of the display is the number of samples. The right side of the display indicates the weight, $\boxed{0}$ means that the weight is zero and $\boxed{\text{-}}$ means that the display is not at zero.

Step 3   Select the number of samples and place the samples specified on the weighing unit. Use the following keys:

    0 - 9 key ....The key to set the number of samples. Maximum is 9999.

    +/- key.....................The key to select the number of samples, 5, 10, 20, 50,100.

    ZERO key ....The key to set the zero point.

    TARE key................The key to tare (when using a container).

ENTER key .... The key to register the unit weight and return to the piece count display. The unit weight is calculated automatically with the weight and the number of samples.

Press the ESC key while pressing +/- key
The key to return to the piece count display without changing the unit weight.

Notes ❑ **It is preferable to have a large number of samples, to minimize the counting error.**
❑ **Press the ENTER key after the STABLE mark turns on.**
❑ **If the total weight of the samples is too light and is not adequate to be used as the unit weight, $\boxed{L\,o\,U\,t}$ is displayed for 2 seconds and returns to the registration display.**

Digital Input
When the unit weight is known, digital input is available.
Step 1 Start with the normal weight mode.
Step 2 Press the SAMPLE key. $\boxed{U\ xxx}$ and the unit weight is displayed with unit **pcs** blinking. Use the following keys:

0 - 9 key .... The key to set the unit weight. Maximum is 5 digits.
+/- key..................... The key to select the weighing unit of the unit weight.
ZERO key .... The key to clear the digital input. $\boxed{U----}$ is displayed.
ESC key.................. The key to return to the weighing mode without changing the registered unit weight.
ENTER key .... The key to register the unit weight and return to the weighing mode.
Press the MODE key while pressing the +/- key……… The key to shift the decimal point.

Command Input
When the unit weight is known, command input via the serial interface is available. For details, refer to "16.3. Command Format".

⏬ 13. Calendar / Clock

The AD-4405A has a built-in calendar/clock backed up by a lithium battery. The calendar/clock continues to operate even after AC power is turned off. Leap years are automatically corrected. The time and date can be added to the output data.

⏬ 13.1. Time and Date Functions

Item	Parameter	Description	
F50 Time display	*0	12 hours (00 to 11 AM/PM)	Display, serial data output and printer output
	1	24 hours (00 to 23)	
F51 Date format	*0	YY/MM/DD	Display, serial data output and printer output
	1	MM/DD/YY	
	2	DD/MM/YY	
F52 Difference between Christian year	00 to 99	(Display/output year) – (Christian year)	Last 2 digits Initial setting is 0.
F53 Year format	*0	2 digits	
	1	4 digits (Numeric)	First 2 digits specified at F54.
	2	4 digits (characters+ Numeric)	Format specified at F54.
F54 First 2 digits of the year	00 to 99	2-digit number (F53=1) or alphabet, blank or dot (F53=2)	Effective when F53=1 or 2

F52 : The display or output year is calculated using the following formula.

Display/output year = Christian era + F52 parameter

Example 1: Christian era = (20)11 and F52= 12, then display/output year = (20)23

Example 2: Christian era = (20)11 and F52=99, then display/output year = (20)10

Keep the internal year in Christian era format because the leap year correction is performed, based on the Christian era.

F53 and F54 : 2 characters can be added to the 2-digit internal year as output data via the serial interface or printer. Additional characters are set at F54.

F53=0   Outputs a 2-digit year.

F53=1   Adds 2 digit numeric characters. The 2-digit number does not increment automatically if the internal year changes from 99 to 00.

Example: F54=20, internal year (after F52 calculation) = 11,

output year = 2011

$F53=2$ Add 2 alphabetical characters including space or dot. Three formats are available: "an alphabet and a space", "an alphabet and a dot", and "one space and an alphabet". Specify the characters to be added at $F54$, referring to the table below.

Output characters and $F54$ setting   ($F53=2$)   (_ : space)

Out	F54	Out	F54	Out	F54	Out	F54	Out	F54	Out	F54
A_	01	N_	14	A.	31	N.	44	_A	61	_N	74
B_	02	O_	15	B.	32	O.	45	_B	62	_O	75
C_	03	P_	16	C.	33	P.	46	_C	63	_P	76
D_	04	Q_	17	D.	34	Q.	47	_D	64	_Q	77
E_	05	R_	18	E.	35	R.	48	_E	65	_R	78
F_	06	S_	19	F.	36	S.	49	_F	66	_S	79
G_	07	T_	20	G.	37	T.	50	_G	67	_T	80
H_	08	U_	21	H.	38	U.	51	_H	68	_U	81
I_	09	V_	22	I.	39	V.	52	_I	69	_V	82
J_	10	W_	23	J.	40	W.	53	_J	70	_W	83
K_	11	X_	24	K.	41	X.	54	_K	71	_X	84
L_	12	Y_	25	L.	42	Y.	55	_L	72	_Y	85
M_	13	Z_	26	M.	43	Z.	56	_M	73	_Z	86

Example: $F54=38$, internal year (after $F52$ calculation) = 17, then
output year = H.17

13.2.   Setting Time and Date

Step 1   Press the PT(4) key while pressing the PRINT key to display $t\,inE$.
Use the following keys.
MODE key........The key to select time ($t\,inE$) or date($dRtE$) to set.
ESC key...........The key to return to the weight display.
ENTER key ......The key to proceed to step 2 ($t\,inE$) or step 3 ($dRtE$).

Step 2   The current time is displayed in the format specified at $F50$ and is updated. A triangle indicates AM (triangle 2) or PM (triangle 3) and no triangle is displayed in 24 hour setting. Set the time using the following keys. Once an effective key is entered, the time update stops.
0 - 9 key ....The key to set the value at the blinking digit. Once set, the blinking digit shifts to the right.
+/- key..............The key to shift the blinking digit to the right (including the triangle).
CLEAR key.......The key to reset the setting and displays the current time.
MODE key........The key to switch between AM and PM when triangle 2 or 3 is blinking.
ESC key...........The key to return to the $t\,inE$ display without changing the time setting.
ENTER key ......The key to store the time setting and return to the $t\,inE$ display.

Step 3   After displaying the date format for 2 seconds, the current date is displayed in the
          $F5 I$ format and the year after $F5\partial$ calculation.
          Set the date using the following keys.
          ⓪ - ⑨ key ....The key to set the value at the blinking digit. Once set, the
                              blinking digit shifts to the right.
          +/- key..............The key to shift the blinking digit to the right.
          CLEAR key.......The key to reset the setting and display the current date.
          ESC key...........The key to return to the │ $dREE$ │ display without changing the
                              date setting.
          ENTER key ......The key to store the date setting and return to the │ $dREE$ │
                              display.
                              If the date setting has some illegal numbers, correction will be
                              performed as shown below, before storing the setting.

          Correction   The days that will be corrected to the 1st day of the next month:
                              Month 4, 6, 9, 11 with day 31.
                              Month 2 with day bigger than 28 or 29 (leap year).
                              A leap year is the multiple of 4 of Christian era (00, 04, …, 96).

                           Example:
                           When the following data is entered,
                              05   04   31   ENTER
                              YY   MM   DD

                           the data will be corrected as follows:
                              05   05   01
                              YY   MM   DD

14. Printer (OP-06)

A dot matrix type printer (OP-06) can be installed in the AD-4405A. It can print out the result of weighing, accumulated weight, date and time, etc. The print format can be arranged by the F-Function settings or by using the serial interface command.

Print

- In the manual print mode, press the PRINT key to print in format 1, or press the MODE key while pressing the PRINT key to print in format 2.
- The print output format is set at $F70$ for format 1 and at $F71$ for format 2 of the F-Functions.
- The print output format can be set using the serial interface (OP-03, OP-05 or OP-08). Refer to "16.3.5. Commands to Set the Data Output/ Print Format (UFC)".
- The number of repeated printings of the identical contents, individually in format 1 and format 2, can be set at $F62$.
- The number of lines that is fed before or after printing, individually in format 1 and format 2, can be set at $F63$ and $F64$.
- The direction of the characters can be set at $F65$.

Examples

All characters

```
* PRINTER TEST *
 !"#$%&'()*+,-./
0123456789:;<=>?
@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[¥]^_
`abcdefghijklmno
pqrstuvwxyz{|}~
```

Date, time, data number, code, gross and net

```
2005/03/21
10:34:56AM
No.    8    CD:3
   G    567.8 kg
   N    423.9 kg
```

Initial setting printing

```
   G    1234.5 kg
```

```
Acc.N 000067
TOTAL
         890  t
```

Parameters 92 and 95

```
--------------------------
2005/03/21   CD:3
Acc.N 000043
TOTAL
         567.89 kg
==========================
```

Installing the Printer Paper

Step 1 Press down the printer cover to release the catch.
Slide the cover downward to open it.

Step 2 Cut the paper end for easy insertion.

Step 3 Insert the paper end into the printer and press the
FEED key to feed the paper.

Step 4 Arrange the ribbon using the dial.

Step 5 Pass the paper end through the cover and close the
cover.

Step 1
Open cover

Step 2
Cut paper end

Roll paper

Step 5
Pass paper
Close cover

Step 3
Press the FEED key
to feed the paper

Ink ribbon

Step 3

Step 4
Arrange ribbon

Front: Roll paper
Rear: Ink ribbon

Roll paper
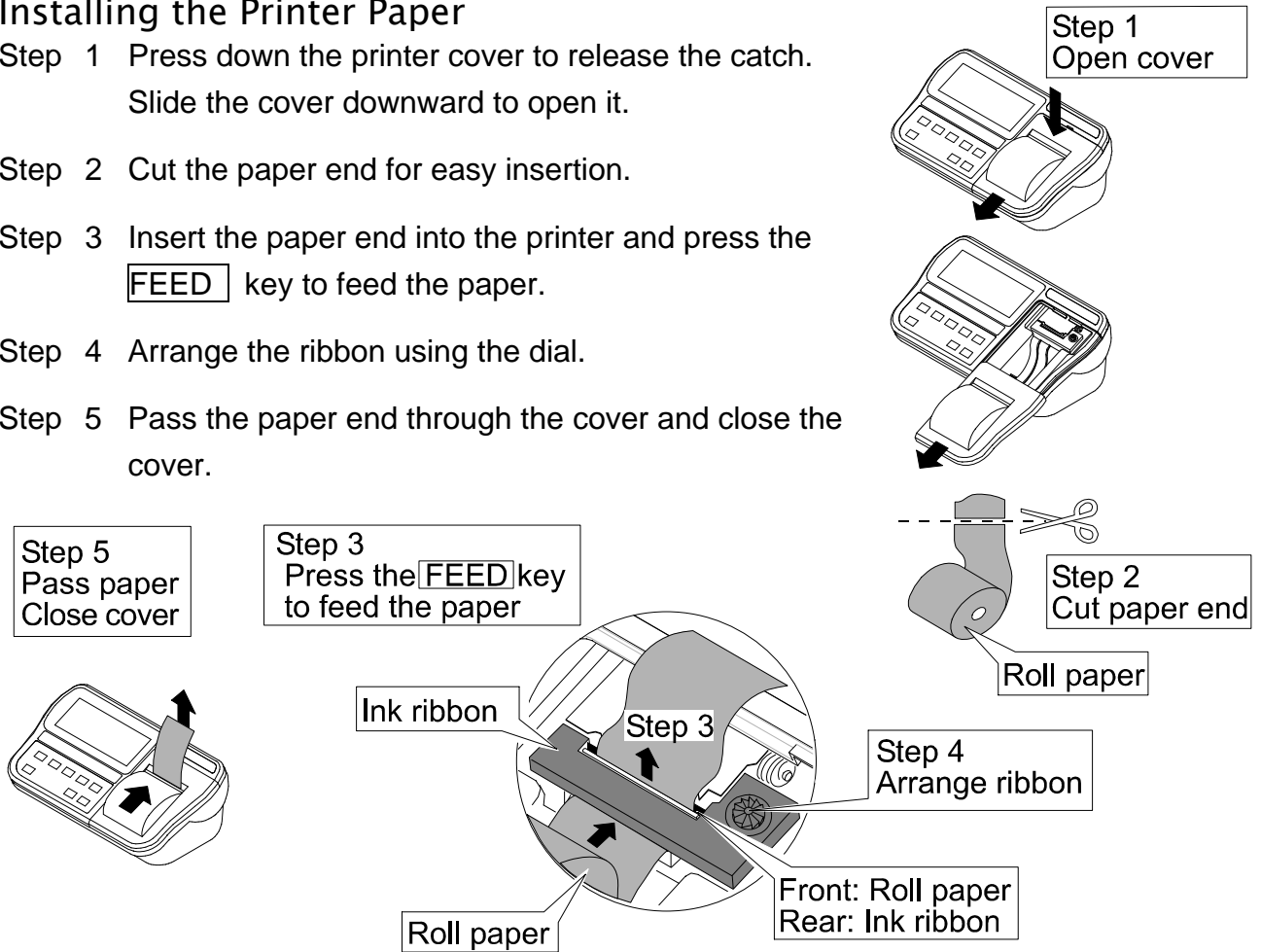
Replacing the Ink Ribbon

Step 1 Press down the printer cover to release the catch.
Slide the cover downward to open it.

Step 2 Press the left side of the ink ribbon to remove it.

Step 3 Replace with a new ink ribbon.

Step 4 Arrange the ribbon using the dial.

Step 5 Close the cover.

Step 1
Open cover

Step 2
Press

Ribbon

Step 4
Arrange ribbon

Step 5
Close cover

Step 3
New ink ribbon
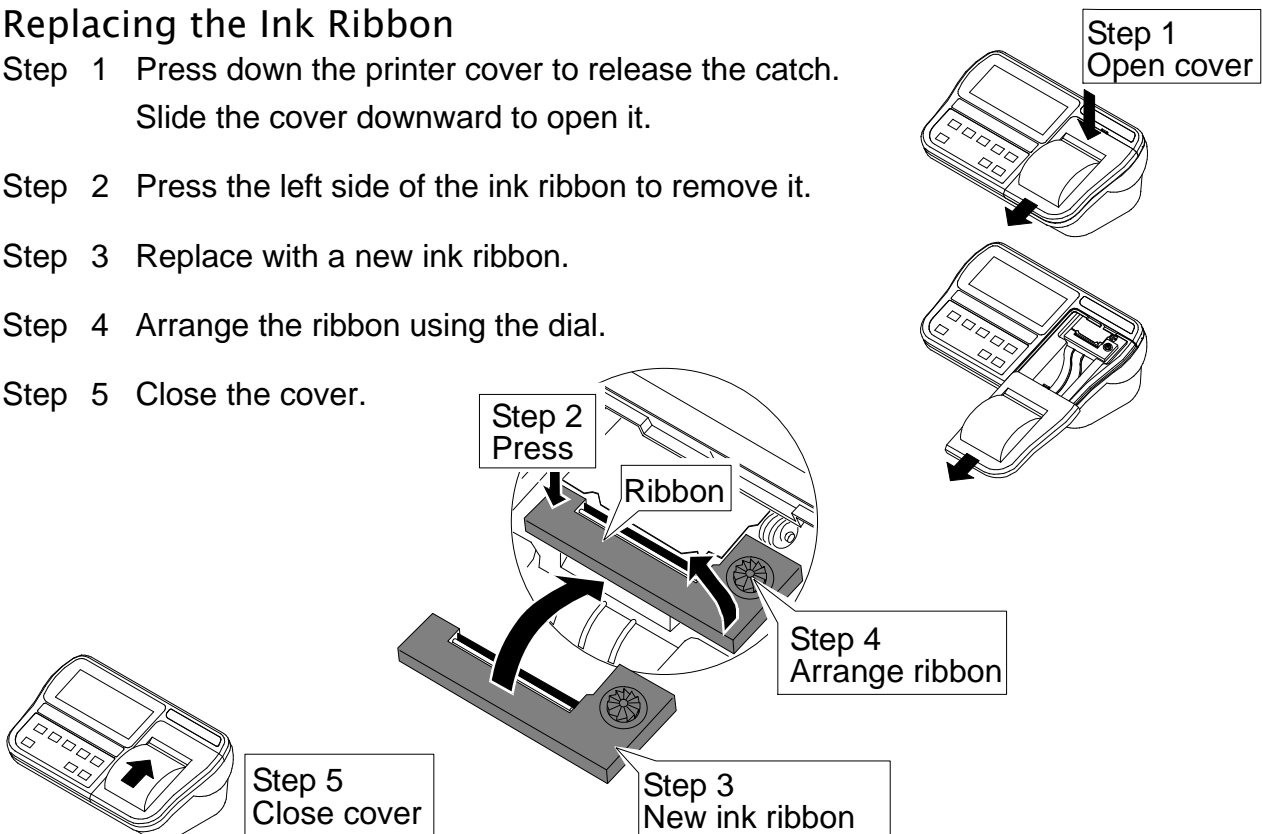
There are some similar functions and operations for the printer and the serial data output (RS-232C, RS-422/485 and the current loop).

Data output / print output mode

Data number (not available for the current loop)

Interval data output or print out (not available for the current loop)

15.1. Data Output / Print Mode

Description of "Stream Mode" (For data output)

Function $F37=0, F40=0$

Operation   The data is output at each sampling (when refreshing the display).

Use this mode to output data to an external display (The data may not be output due to timing of the baud rate and internal sampling rate) or to print data by pressing the PRINT key on the printer.

The serial interface command can not be used at $F40=0$.

Description of "Manual Print"

Function $F37=1, F40=1, F60=1$

Operation   When the PRINT key is pressed or the external input is set to output or print, the stable weight data is output or printed just once.

The serial interface command can be used at $F40=1$.

Description of "Auto Print Mode"

Function $F37=2$ or 3, $F40=2$ or 3, $F60=2$ or 3,

Operation   When the weight data enters the "inhibit region for output" and becomes stable in the "permission region of output", the stable data is output or printed just once. To use this mode, set $F02$ to 1 to 10, but not 0.

The serial interface command can be used at $F40=2$ or 3.

❑   For weighing (and removing) each object and printing the data.

❑   In case of $F37=2, F40=2, F60=2$

"Inhibit region for output" ≦ +5d.   +5d < "permission region of output".

❑   In case of $F37=3, F40=3, F60=3$

-5d ≦ "inhibit region for output" ≦ +5d.

"Permission region of output" < -5d, +5d < "permission region of output".

d: division (weighing interval) of the first range.

Description of "Accumulated Data Output/Print"

Function $F37=4, F40=4, F60=4$

Operation   When accumulation (manual or automatic) is performed, data is output or printed automatically with the accumulated data.

The serial interface command can be used at $F40=4$.

Description of "Command Mode" (For Serial Interface)

Function   F40=5

Operation   The serial data can be output by the serial interface command only.

When multiple instruments are used, using this mode will avoid data conflicts or accidental data output by mis-operation.

Description of "Delay for Continual Data"

Function   F38, F42

Operation   This function can be used in the "Auto print mode" and "Manual print mode".

When using a non-buffered printer, set F42 to 3 and F43 to 1 (or F38 to 1).

⬇ 15.2.   Data Number

The data number increments automatically with each serial data output or print out respectively from 1 to 99999 (1 comes after 99999). The starting number can be set using the keys.

Setting the Serial Data Number

Press the CODE(1) key while pressing the PRINT key at the weight display. The display changes to dAtA r then r xxx. "xxx" is the next data number. Use the 0 - 9 keys to enter the number, then press the ENTER key to store the number and return to the weight display.

Setting the Print Data Number

Press the SAMPLE(2) key while pressing the PRINT key at the weight display. The display changes to dAtA P then P xxx. "xxx" is the next data number. Use the 0 - 9 keys to enter the number, then press the ENTER key to store the number and return to the weight display.

Note   1. **When setting the number, the following keys are available.**

+/- key   Sets the number to 1.

ZERO key   Sets the number to 0.

ESC key   Returns to the weight display without changing the number.

2. **When the number is set to 0, it is entered as 1 automatically.**

⬇ 15.3.   Interval Data Output / Print

The AD-4405A can output or print data with a constant time interval using the internal calendar/clock function. The time intervals for serial data output and for the printer can be set individually from 1 second up to 23 hours and 59 minutes.

Caution   **The interval time must be set to allow enough time to finish output or printing out.**

15.3.1.   Setting the Interval Time

Step 1   Press the SETPOINT(3) key while pressing the PRINT key to display | $int \bar{u}AL$ |
for 2 seconds.

Step 2   Select which interval time to set, using the following keys.
MODE key........The key to select serial output | $int \ 5 \ i$ | or printer output | $int \ Pr$ |.
ESC key...........The key to return to the weight display.
ENTER key ......The key to proceed to the time setting (Step 3).

Step 3   Set the interval time using the following keys. The key operation is the same as the
time setting.
0 - 9 key ....The key to set the value at the blinking digit. Once set, the
blinking digit shifts to the right.
+/- key..............The key to shift the blinking digit to the right.
CLEAR key.......The key to reset the setting and display the interval time stored in
memory.
ESC key...........The key to return to Step 2 without changing the interval time
setting.
ENTER key ......The key to store the interval time setting and return to Step 2.

15.3.2.   Interval Data Output / Print Output

❑ Set the data output mode or print mode to "Manual mode" respectively to interval
data output or print out.
❑ Pressing the START(7) key while pressing the PRINT key will start the interval
timer and output or print out the first data in the specified format.
❑ The optional printer prints the interval time setting before printing the data.
❑ Pressing the STOP (8) key while pressing the PRINT key will stop the interval
timer and output or print out the data.
The optional printer prints "Intv. Stop" before printing the data.
❑ The optional printer replaces overload data with spaces except for the decimal
point.

16. RS-232C Interface

16.1. Specifications

Transmission	Asynchronous, bi-directional, half-duplex
Baud rate	600, 1200, 2400, 4800, 9600 bps
Data bits	7 bits, 8 bits
Parity bit	1 bit, Even or Odd (for 7 data bits) or Non parity (for 8 data bits)
Start bit	1 bit
Stop bit	1 bit
Code	ASCII
Terminator	CR LF, CR (CR: 0Dh,　LF: 0Ah)
Connector	D-sub 9 pin connector

Circuit and Pin Connection

Pin No.	Signal name	Direction	Description
2	TXD	Output	Transmit data
3	RXD	Input	Received data
5	SG	-	Signal ground
6	DSR	Output	Data set ready
7	(RTS)	-	Pin 7 is connected to pin 8
8	(CTS)		
Case	FG	-	Shield (Frame ground)
Other			Not used
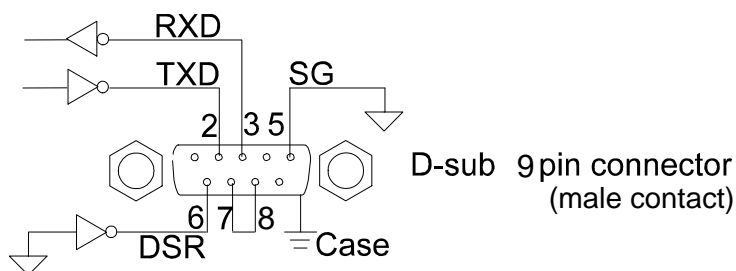
Bit Format
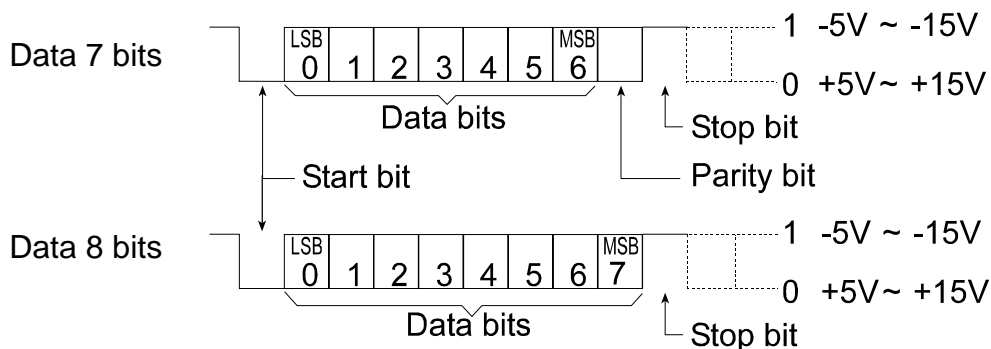
16.2. Data Format

- Two types of data format can be set at F-Function $F34$ and $F35$.
- The initial data format of $F34$ is shown below.

| S | T | , | G | S | , | + | 0 | 0 | 0 | 0 | 0 | . | 0 | k | g | C_R | L_F |

8-bit data   Terminators

Header 1   Header 2   Unit

S	T
U	S
O	L
H	D

G	S
N	T
T	R
P	T

G	␣
N	␣
T	␣
P	T

$CF06=0,1$ $CF06=2$

k	g
␣	g
␣	t
P	C

␣	k	g
␣	␣	g
␣	␣	t
␣	P	C

$CF07=0$ $CF07=1$
2 digits   3 digits

- ␣ Space code(20h)
- C_R Carriage return(0Dh)
- L_F Line feed(0Ah)
- . Decimal point :
  Dot(2Eh) or
  Comma(2Ch)

l	b
o	z
c	y
t	l

␣	l	b
␣	o	z
␣	c	y
␣	t	l
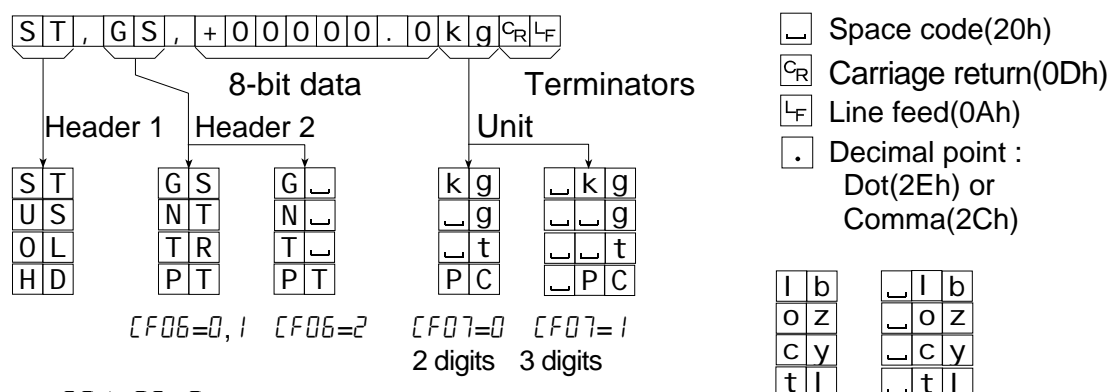
Header 1 $F34, 35=9$ (Status)
- ST   Stable weight data
- US   Unstable weight data
- OL   Overload (Out of range)
- HD   Held weight data (The response of the "RW and "RW,n" command)

Header 2 $F34, 35=E$ (weight type)
- GS or G   Gross data
- NT or N   Net data
- TR or T   Tare data
- PT   Preset Tare

Data $F34, 35=A, b, C, d$ (weight data)
The first of the data bits is the polarity, "+" or "-".
When the data is zero, the polarity is "+".
8 bits including polarity and decimal point (dot or comma).
In case of "out of range", the data are replaced with spaces except the decimal point.

Unit $F34, 35=F$ (unit)
In case of $CF07=0$, the unit length is 2 digits.
In case of $CF07=1$, the unit length is 3 digits. Depending on circumstances, an A&D printer may not work correctly.

16.3. Command Format

Description of Commands

- When performing a command, the received command or replay data is sent back.
- When the received command can not be performed such as in the "busy" state, the code " I " is sent back. In this case, insert a delay time. Electrical noise may be the cause of this error.
- When receiving an undefined command (unknown command), a "?" is sent back.
- When the memory is insufficient to store the data of the UFC commands, an "M" is sent back.
- Optional addresses can be added to a command. The address form is "@address" and the address is specified at F-Function F06. The reply (data or error code) is also sent with the address.

Example: The command is "Display net data". The address is 23.

Sending a command

M N C_R L_F
     Terminators
   Command

Sending a command with address

@ 2 3 M N C_R L_F
      Terminators
     Command
   Address number

Unperformed command reply

I C_R L_F
  Terminators
 Unperformed command

Unknown command reply

@ 2 3 ? C_R L_F
     Terminators
    Unknown command
   Address number
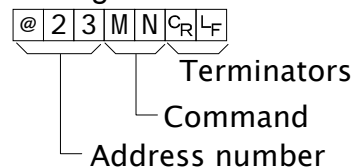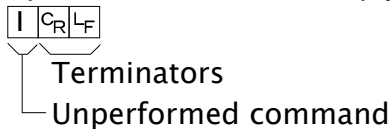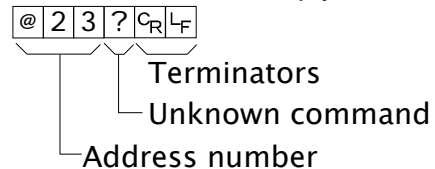
Memory overflow (for UFC commands)

M C_R L_F
  Terminators
 Memory overflow error
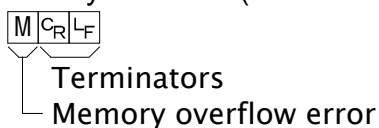
C_R Carriage return(0Dh)
L_F Line feed(0Ah)

16.3.1. Commands to Request Data

Request for the Display Data (1)

When receiving this command, the display data is returned immediately.

Template   RW

Command   `R W [CR][LF]`

Reply   `S T , G S , + 0 0 1 2 3 . 0 k g [CR][LF]`

Request for the Display Data (2)

When receiving this command, the display data is returned immediately with format 1 or 2.

Template   RW,1   or   RW,2

Command   `R W , 1 [CR][LF]`   or   `R W , 2 [CR][LF]`

Reply   Format1 (F34)   or   Format2 (F35)

Request for the Gross weight

When receiving this command, the gross data is returned immediately.

Template   RG

Command   `R G [CR][LF]`

Reply   `S T , G S , + 0 0 1 2 3 . 0 k g [CR][LF]`

Request for the Net weight

When receiving this command, the net data is returned immediately.

Template   RN

Command   `R N [CR][LF]`

Reply   `S T , N T , + 0 0 1 2 3 . 0 k g [CR][LF]`

Request for Tare weight

When receiving this command, the tare data is returned immediately.

Template   RT

Command   `R T [CR][LF]`

Reply   `S T , T R , + 0 0 1 2 3 . 0 k g [CR][LF]`

Request for the Accumulated Data

When receiving this command, the accumulated data is returned immediately.

Template   RA

Command   `R A [CR][LF]`

Reply   Refer to the fixed data format of "8.2. Display and Operation, Output of Accumulated data".

Is the Display Zero

When receiving this command, returns "at zero point" or not is returned immediately.

Template   RZ

Command   `R Z [CR][LF]`

Reply   `1 [CR][LF]`   When at ZERO   `0 [CR][LF]`   Not at ZERO

16.3.2.   Commands to Control the Indicator

Zero the Display
Sets the current display to the zero point.

Template   MZ

Command   M Z C_R L_F

Reply   M Z C_R L_F

Tare
Sets the current display to zero of the net data.

Template   MT

Command   M T C_R L_F

Reply   M T C_R L_F

Clear the Tare Data
Clears the tare data and displays the gross data.

Template   CT

Command   C T C_R L_F

Reply   C T C_R L_F

Display the Gross Data
Displays the gross data.

Template   MG

Command   M G C_R L_F

Reply   M G C_R L_F

Display the Net Data
Displays the net data.

Template   MN

Command   M N C_R L_F

Reply   M N C_R L_F

Accumulation (M+)
Accumulates the displayed data.

Template   MA

Command   M A C_R L_F

Reply   M A C_R L_F

Clearing the Accumulated data
Clears the accumulated data.

Template   CA

Command   C A C_R L_F

Reply   C A C_R L_F

Changing the Weight Unit

Changes the weight unit.

Template   UC

Command | U | C | C_R | L_F |

Reply | U | C | C_R | L_F |

Changing the Code Memory

Changes the Code Memory number.

Template   SC,m

                 m: code memory number, 0 - 4

Command | S | C | , | 2 | C_R | L_F |

Reply | S | C | , | 2 | C_R | L_F |

Disabling the Key Switches

Disables the key switches. Once power is turned off, this command has no effect.

Template   DK,n

                 n: key switch number (0: all keys, 1 - F: refer to F-Function F12)

Command | D | K | , | 4 | C_R | L_F | Example: to disable the TARE key

Reply | D | K | , | 4 | C_R | L_F |

Enabling the Key Switches

Enables the key switches that were disabled by the DK command. Not applicable to the keys disabled by F12.

Template   EK,n

                 n: key switch number (0: all keys, 1 - F: refer to F-Function F12)

Command | E | K | , | 0 | C_R | L_F | Example: to enable all keys

Reply | E | K | , | 0 | C_R | L_F |

16.3.3.   Commands to Set Parameters

Set the Limit/Setpoint Value

Sets the limit or setpoint value of the comparison. The decimal point is not necessary.

Template   Sm,n, [value]

     m: code memory number, 0 - 4

     n : setpoint order number, refer to "10.1.2. Setting the Upper/Lower Limit values" and "10.2.3. Setting the Parameters of Setpoint Comparison".

Command | S | 1 | , | 3 | , | + | 1 | 6 | 0 |C_R|L_F|

Reply | S | 1 | , | 3 | , | + | 1 | 6 | 0 |C_R|L_F|

Set the Zero Band

Sets the F26 value (zero band) of the comparison. The decimal point is not necessary.

Template   SZ, [value]

Command | S | Z | , | + | 7 | 4 | 8 |C_R|L_F|

Reply | S | Z | , | + | 7 | 4 | 8 |C_R|L_F|

Set the Preset Tare

Sets the preset tare value. The decimal point is not necessary.

Template   PT,m, [value]

     m: code memory number, 0 - 4

Command | P | T | , | 2 | , | 2 | 1 | 3 |C_R|L_F|

Reply | P | T | , | 2 | , | 2 | 1 | 3 |C_R|L_F|

Set the Unit Weight for Counting Mode

Sets the unit weight value with decimal point.

Template   UW,m, [value]

     m: code memory number, 0 - 4

Command | U | W | , | 2 | , | 2 | 1 | . | 3 |C_R|L_F|

Reply | U | W | , | 2 | , | 2 | 1 | . | 3 |C_R|L_F|

16.3.4.   Commands for the Hold Function

Start Averaging to Hold

Starts averaging to hold. The reply differs with the conditions.

Template HS

Command |H|S|C_R|L_F|

Reply |H|S|C_R|L_F| Averaging start

|H|D|,|1|C_R|L_F| Averaging now

|H|D|,|2|C_R|L_F| Held

Release the Hold Data

Releases the hold data or stop averaging and goes to the normal weighing mode.

Template HC

Command |H|C|C_R|L_F|

Reply |H|C|C_R|L_F|

Request the Hold Status

When receiving this command, the averaging/hold state is returned immediately.

Template HD

Command |H|D|C_R|L_F|

Reply |H|D|,|0|C_R|L_F| Not hold nor averaging

|H|D|,|1|C_R|L_F| Averaging now

|H|D|,|2|C_R|L_F| Held

16.3.5.   Commands to Set the Data Output/ Print Format (UFC)

Set Serial Data Format

Sets the serial output data format.

Format 1 (2) data is stored in the same memory area of F34 (F35).

Template SFf, [parameters]

f: Format number, 1 or 2

Command |S|F|1|,|$|G|R|C_R|L_F|

Reply |S|F|1|,|$|G|R|C_R|L_F|

Set Print Format

Sets the print out data format.

Format 1 (2) data is stored in the same memory area of F70 (F71).

Template PFf, [parameters]

f: Format number, 1 or 2

Command |P|F|1|,|$|G|R|C_R|L_F|

Reply |P|F|1|,|$|G|R|C_R|L_F|

16.4. UFC Commands

❏ UFC (Universal Flexi Coms) function enables editing the serial data output format or the print output format freely using the serial interface command.

❏ For customizing the print out of the printer or efficient data collection.

❏ Output data is not only the indicator's data/status but also characters at will.

❏ It can output the control code* of the printer. (* depends on the individual printer)

❏ There are 2 sets of memories for storing the parameters.

UFC Command Parameters

UFC commands such as SF1, PF1 have many parameters.

❏ One command line can have multiple parameters. The parameters are stored in memory in order.

❏ Multiple UFC commands are acceptable. Parameters are stored next to the last parameter stored by the last UFC command.

❏ Clear all of the data first, if storing a new set of parameters. The parameters in the stored data can not be changed partially.

❏ The various types of parameters and their descriptions are shown below.

Data	Weight, result of comparison, etc.	
	$CL	Clear previous settings. UFC command parameters can not be changed partially.
	$WT	Displayed data
	$GR	GRoss data
	$NT	NeT data
	$TR	TaRe data
	$HD	Header of Gross/Net/Tare or Preset tare. Refer to CF06.
	$UT	Weight UniT
	$ST	STable/Unstable
	$CP	Result of ComParison
	$ID	ID number specified at F06
	$DT	Date
	$TM	Time
	$DN	Data number increments with each output automatically
	$CD	CoDe memory number
	$AN	Accumulation count
	$TL	TotaL weight
	$CM	CoMma
	$CR	CR code (0Dh)
	$LF	LF code (0Ah)
	$DE	DElete the last parameter

$DL   Inserting a DeLay time (0.1 second step)
                Example: DL10 : 1.0 second delay

Strings

Output or print specified strings enclosed by a single quotation (').

' itself is described using three single quotations; '''.

   Example: 'A & D'   'This is a sample of ''' .'

Set data bits = 8 bits if using the 8-bit characters.

Hexadecimal

Control code of the printer etc. preceded by #.

2 characters proceeded by # is hexadecimal code.

   Example: #09, #7C

The #FF code can not be used because it is used for internal control.

❑ Example

SF1,IDDNCRLFGRUTCRLF

   Serial output data format 1, ID number, data number, carriage return and line
   feed, Gross weight, unit, carriage return and line feed.

SF2,'   Welcome to A & D'$LF'Total weight   '$ANTLLF$LF

   Serial output data format 2, the strings '   Welcome to A & D' and line feed,
   the strings 'Total weight   ' accumulation count, total weight, and 2 sets of line
   feed.

PF2,DTTMLFANSPTL$LF

| ```
05/03/21 01:34PM

Acc.N 000123
TOTAL
        4567.8 kg
``` | Date and time<br>Line feed<br>Accumulation count<br>Total weight<br>Line feed |

17. RS-422/RS-485, Relay Output (OP-03)

❑ Replacing the RS-232C interface with this option, the RS-422/RS-485 interface can connect up to 32 indicators and control them from a computer or a PLC.

❑ The functions of the RS-422/RS-485 interface are common to RS-232C except the signal system.

❑ The relays output the result of comparison.

> Solid-state-relay
> Maximum voltage 50VDC
> Maximum current 100mA DC
> Maximum resistance 8Ω

❑ Pin connections

Function	Pin No.	Signal name	Direction	Description
RS-422 RS-485	1	SDA	Output	Transmission A terminal
	2	SDB	Output	Transmission B terminal
	3	RDA	Input	Receive A terminal
	4	RDB	Input	Receive B terminal
	5	TRM	-	Terminator resistor (100Ω)
	6	SG	-	Signal ground
Relay output	7	HI	Output	Relay output HI
	8	OK	Output	Relay output OK
	9	LO	Output	Relay output LO
	10	COM	-	Relay output common

❑ Adaptable connector   TM-BLA10 (provided with the OP-03)

❑ An AC adapter (provided with the OP-03) must be connected to the option board when using the RS-422 or RS-485 interface. If using relay output only, the AC adapter is not required.

Circuit

7 - 10V DC
AC adapter Jack
(The AC adapter is provided with the OP-03)
Note: Please confirm that the AC adapter type is correct for your local voltage and receptacle type

Switching Between RS-422/RS-485

Switching between RS-422/RS-485 is made with the slide switch (SW1) on the OP-03 board.

Connection

❑ The polarity of signals A and B may vary with different computers.

❑ It is not necessary to ground the SG terminal when using a computer without a signal ground terminal.

RS-422   RS-485

Some computers have terminators inside.

Connect a terminator to the end connection.
Internal termination resister is effective when the TRM terminal is connected to the RDB terminal.

18. Relay Output and Control Input (OP-05)

❑ Replacing the RS-232C interface with this option, 3-relay outputs and 3-control inputs can be used with the RS-232C interface of this option.

❑ RS-232C functions and pin connections are the same as the RS-232C interface described in "16. RS-232C Interface".

❑ The control inputs can control the indicator from an external terminal just like the front panel key operations.

❑ Set the external control functions at $F\ 13$, $F\ 14$ and $F\ 15$ of the F-Functions.

❑ When connecting each function pin to the common pin, the indicator makes the action.

❑ Keep a signal width more than 100 ms for the On-time and Off-time.

❑ The relays output the result of comparison.

Solid-state-relay

Maximum voltage   50VDC

Maximum current   100mA DC

Maximum resistance 8Ω

❑ Pin connections (DIN 8pin connector)

Function	Pin No.	Signal name	Direction	Description
Relay output	1	HI	Output	Relay output HI
	6	OK	Output	Relay output OK
	4	LO	Output	Relay output LO
	8	COM(out)	-	Relay common terminal
Control input	3	EXT1	Input	Control input 1 ($F\ 13$)
	5	EXT2	Input	Control input 2 ($F\ 14$)
	7	EXT3	Input	Control input 3 ($F\ 15$)
	2	COM(in)	-	Control input common

❑ Adaptable connector   JA-TCP0586 (provided with the OP-05)

Circuits

19. 4-20mA Analog Output (OP-07)

❑   The OP-07 analog output option is for sending the weight data to an analog input unit.

❑   The output is a 4mA to 20mA current output proportional to the display reading.

❑   The output data is updated in synchronization with the display update.

Specifications

Output current	4mA to 20mA *	Non-linearity		Less than +/- 0.1% fs
Load resistance	0 to 510 Ω	Temperature	ZERO	Less than +/- 0.02% fs/°C
Resolution	Approx. 1/10000	coefficient	SPAN	Less than +/- 0.02% fs/°C
Output terminal	Connector terminal No.1 : + No.2 : - No.3 : FG(Earth)			
Accessory	Connector terminal (1) TM-MSTB03STF AC adapter (1) **Note: Please confirm that the AC adapter type is correct for your local voltage and receptacle type.**			

* When set to non-weight display (Calibration, F-settings etc.), output current is 4mA. The output current is not adjustable.

+ -
DC
7 - 10VDC
AC adapter Jack

1 2 3
+ − FG
Analog output terminal

Settings

Set $F30$ to 1 of the F-Function, and set $F31$, $F32$ and $F33$.

	Item	Parameter	Remarks	
Data output	$F30$ Data output	* 0	No output	Initial setting
		1	Analog output	Must be set to 1
		2	Serial in/out 1	
		3	Serial in/out 2	
Analog output	$F31$ Output data	* 0	Displayed value	Initial setting
		1	GROSS weight	
		2	NET weight	
	$F32$ Weight value at 4mA	-999999 to 999999 (Initial setting is 0)		Decimal point is set at "CALSEt"
	$F33$ Weight value at 20mA	-999999 to 999999 (Initial setting is 10000)		Decimal point is set at "CALSEt"

Settings of $F32$ and $F33$

When entering the $F32$ or $F33$ settings (press the ENTER key when "32" or "33" is blinking), the setting value is displayed. Set the value using the 0 - 9 key. By pressing the +/− key, the polarity of the value can be alternated. Press the ENTER key to store the setting value into memory. After this the display returns to selection of the Function number.

Output current
20mA
b   a
4mA
$F32$ a $F33$ a
$F33$ b $F32$ b   Weight

20.Current Loop Output (OP–08)

❑ Replacing the RS-232C interface with this option, current loop output, 3-relay outputs and 1-control input can be used with the RS-232C interface of this option.

❑ RS-232C functions and pin connections are the same as the RS-232C interface described in "16. RS-232C Interface".

❑ The control input can control the indicator from an external terminal just like the front panel key operations.

❑ Set the external control function at $F\ 15$ of the F-Functions.

❑ When connecting the function pin and the common pin, the indicator makes the action.

❑ Keep a signal width of more than 100 ms for the On-time and Off-time.

```
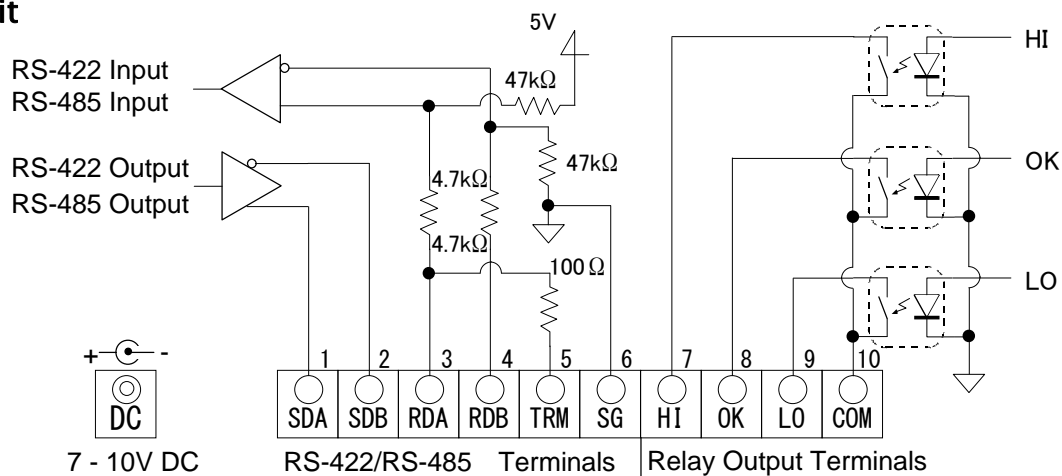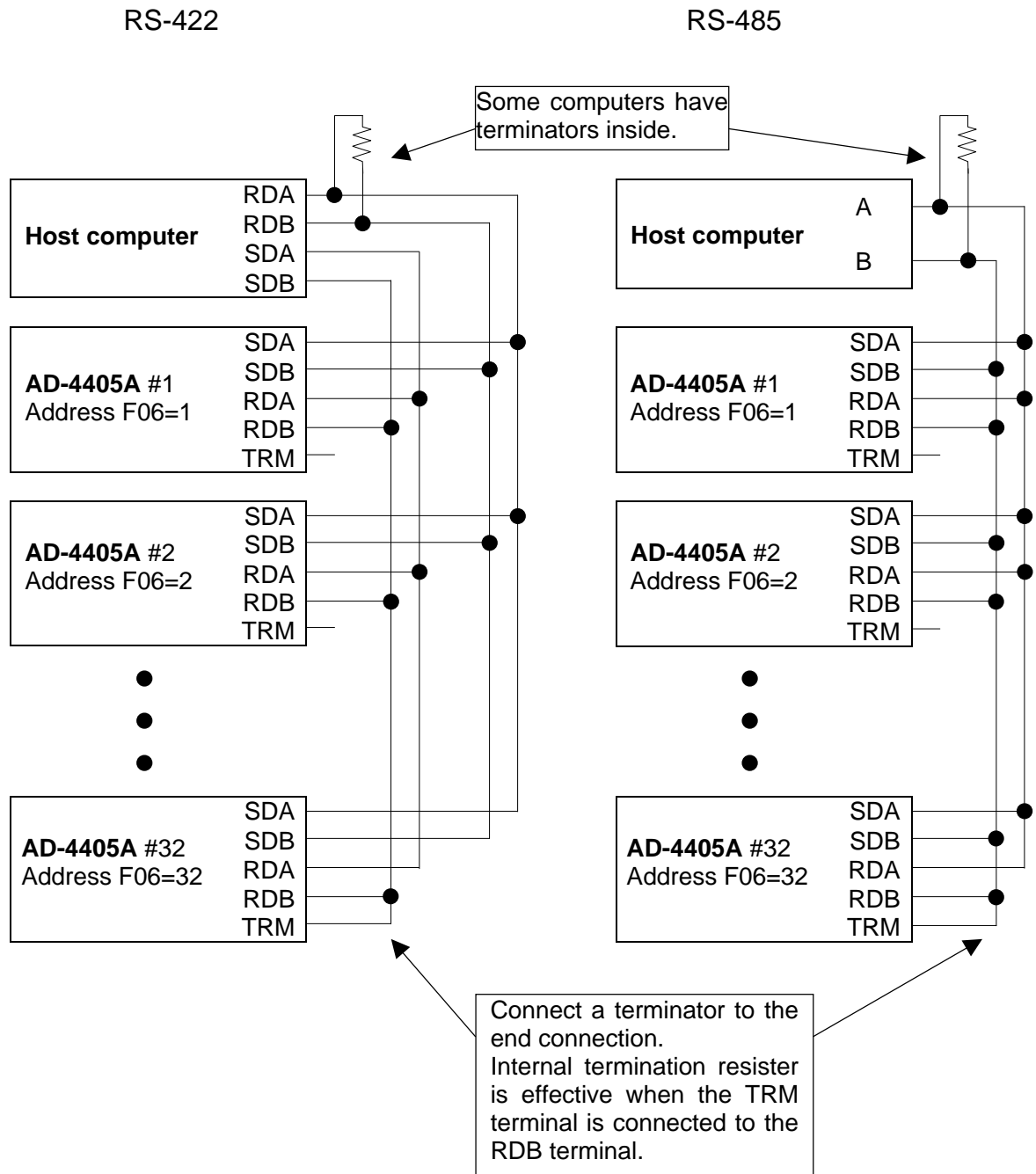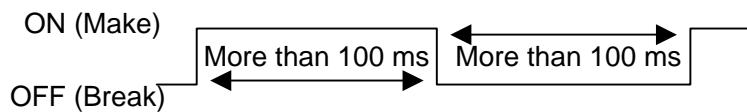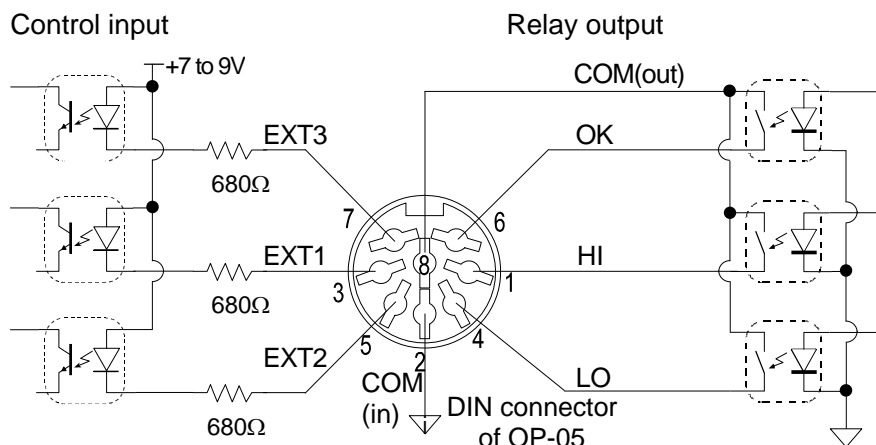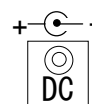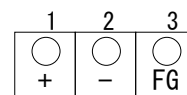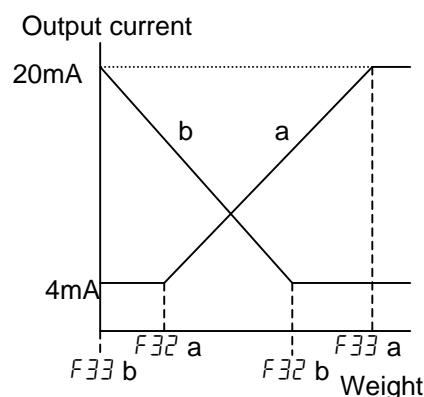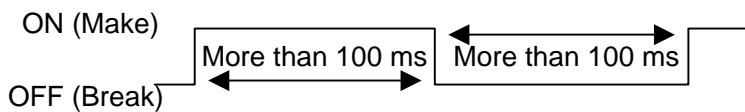ON (Make)
                    ┌──────────┐          ┌────────
           ┌────────┤          ├──────────┘
OFF (Break)┘        │          │
           More than 100 ms  More than 100 ms
```

❑ The relays output the result of comparison.

    Solid-state-relay

    Maximum voltage   50VDC

    Maximum current   100mA DC

    Maximum resistance 8Ω

❑ Pin connections (DIN 8pin connector)

Function	Pin No.	Signal name	Direction	Description
Relay output	1	HI	Output	Relay output HI
	6	OK	Output	Relay output OK
	4	LO	Output	Relay output LO
	8	COM(out)	-	Relay common terminal
Current loop	3	CL1	Output	Current loop output 1
	5	CL2	Output	Current loop output 2
Control input	7	EXT3	Input	Control input 3 ($F\ 15$)
	2	COM(in)	-	Control input common

❑ Adaptable connector   JA-TCP0586 (provided with the OP-08)

Circuits

Current Loop Output

❑ The current loop output can be used to output data to an A&D printer and a display unit.

❑ The current loop output is of the passive type and requires an external current source of 20 mA current. A&D's printer and display unit can be connected without external power source, because they supply the current.

❑ The output terminals do not have a polarity. Each output terminal can be connected to either the plus or minus inputs of the peripheral unit.

❑ Set *F36*, *F37*, *F38* and *F39* of F-Functions. Please note the initial setting of *F37* is disabling the current loop output.

Data Format

❑ The data format is the same as that of the initial setting of *F34* of RS-232C data format.

❑ The current loop output data format is fixed and can not be changed.

❑ Header 2 and the unit selection are common to RS-232C (*CF06*, *CF07*).

❑ Decimal point (dot or comma) and delimitter (comma or semicolon) can be set by *F46*.

⎵ Space code(20h)
CR Carriage return(0Dh)
LF Line feed(0Ah)
. Decimal point : Dot(2Eh) or Comma(2Ch)

21. Specifications

Analog Input and A/D Conversion

Input sensitivity	0.15 μV/division
Input signal range	-35 mV to +35 mV
Load cell excitation voltage	5VDC ±5%, 60 mA with sense voltage input
Load cell drive capacity	Maximum 4 x 350 Ω load cells
Temperature coefficient — Zero	±0.02 μV/°C (typ.) ±0.1 μV/°C (max.)
Temperature coefficient — Span	±3ppm/°C (typ.) ±15ppm/°C (max.)
Non-Linearity	0.005 % of full scale
Maximum input noise	0.15 μVp-p (typ.)
Input impedance	10 MΩ or more
A/D conversion method	Delta-sigma method
A/D resolution count	16000000 counts
A/D conversion rate	Approximately 10 times/s
Maximum display resolution	20000 (permissible 40000)

Digital Section

Measurement display		7 segment, Vacuum fluorescent display tube
	Character color	Cobalt-blue
	Character height	20 mm
State indicator Symbol		Minus sign, Zero point, Stable, Net, Preset tare value, Storing accumulated data, Percentage, Various state indicator (triangle1, 2,3)
	Character color	Cobalt-blue
Comparison result		HI, OK, LO
	Character color	Red for HI and LO, Green for OK
Unit		kg, g, t (lb, oz, lb-oz / catty, tl, catty-tl: depends on the region)
	Character color	Cobalt-blue

Interface

RS-232C interface	Serial interface for communication (D-Sub 9P)
RS-422/485 interface	Serial interface for communication, control (terminal block)
Current Loop output	20mA, Passive type (DIN 8P)
Analog output	4-20mA, free scaling output (terminal block)
External Control Input	3 (or 1) contact input terminals, selected functions (DIN 8P)
Relay output	3 point (DIN 8P or terminal block)
	Capacity: 50V AC/DC, maximum current 100mA (resistive load)
	Comparison mode selection
	HiHi, Hi, OK, Lo, LoLo output for limit comparison
	Zero band, preliminary, free fall, final for setpoint comparison

Printer

Printer	5 x 7 dot matrix type, 16 digits per line

General

Power supply	Selection by internal connector from 100V AC, 120V AC, 200V AC and 230V AC, +10% to -15%, 45Hz to 65Hz
Power consumption	Approximately 20VA
Operation temperature	-10°C to +40°C (14°F to 104°F)
Operation humidity	85% R.H. (no condensation)
Mass	Approximately 1550 g
Dimensions	275 (W) x 111 (H) x 158.5 (D) mm
Accessories	Refer to "4.4. Accessories and Option"

21.1. Dimensions

Unit: mm

MEMO

MEMO

AD-4405A Weighing Indicator