GX-A Series / GF-A Series   Communication Manual

En Ver. 1.01

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1. Introduction

This communication manual is a supplementary instruction manual for connecting the balance to peripheral devices such as PCs and printers through the use of its communication function.

1-1. Applicable models

Models to which this the contents of this communication manual is applicable are as follows.

□ GX-A Series

GX-1603A, GX-1003A, GX-603A, GX-403A, GX-303A, GX-203A

GX-10002A, GX-6002A, GX-4002A, GX-3002A, GX-2002A

GX-10001A, GX-6001A

□ GF-A Series

GF-1603A, GF-1003A, GF-603A, GF-403A, GF-303A, GF-203A

GF-10002A, GF-6002A, GF-4002A, GF-3002A, GF-2002A

GF-10001A, GF-6001A

1-2. Features of the communication function

□ The RS-232C interface is provided as standard, enabling communication similar to conventional balances.

□ A USB interface is provided as standard and you can select between a quick USB for inputting the weighing result directly into the PC software or bidirectional communication using a virtual COM port.

□ By using the GXA-03: RS-232 C interface isolation type, which is a specialized option, an RS-232C interface can be added.

2. Interface specifications

2-1. RS-232C

Connector: D-Sub9-pin（male）

Method of transmission: EIA RS-232C

Format of transmission: Asynchronous, two-way, half-duplex transmission

Data transmission rate: 5 times per second（ca. 5.21Hz）, 10times per second（ca. 10.42Hz）、
20 times per second（ca. 20.83Hz）

Linked with the setting value of the internal setting's display rewrite cycle

Signal format   Baud rate   600, 1200, 2400, 4800, 9600, 19200, 38400 bps

Data bits   7 or 8 bits

Parity   EVEN、ODD   （Data length   7 bits）
NONE   （Data length   8 bits）

Stop bits   1 bit

Code   ASCII

Format of 1 character

D-Sub9, pin arrangement

Pin No.	Signal name	Direction	Meaning, remarks
1	-	-	N.C.（same potential with SG）
2	RXD	Output	Transmitted data
3	TXD	Input	Received data
4	-	-	N.C.
5	SG	-	Signal ground
6	DSR	Output	Data Set Ready
7	RTS	Input	Request to Send
8	CTS	Output	Clear to Send
9	-	Output	N.C. (12V Output)

Connection diagram （when connecting to a PC）

Inch screw #4-40UNC

2-2. USB

Connector: miniB（female）

Standard: USB 2.0

Device class: HID（Human interface device）：Quick USB

                                 CDC（Communication device class）：Virtual COM

miniB, pin arrangement

Pin No.	Signal name	Direction	Meaning, remarks
1	VBUS	Input	Power （connection confirmation）
2	D-	-	Data transmission and reception
3	D+	-	Data transmission and reception
4	ID	-	N.C.
5	GND	-	Signal ground

5 4 3 2 1
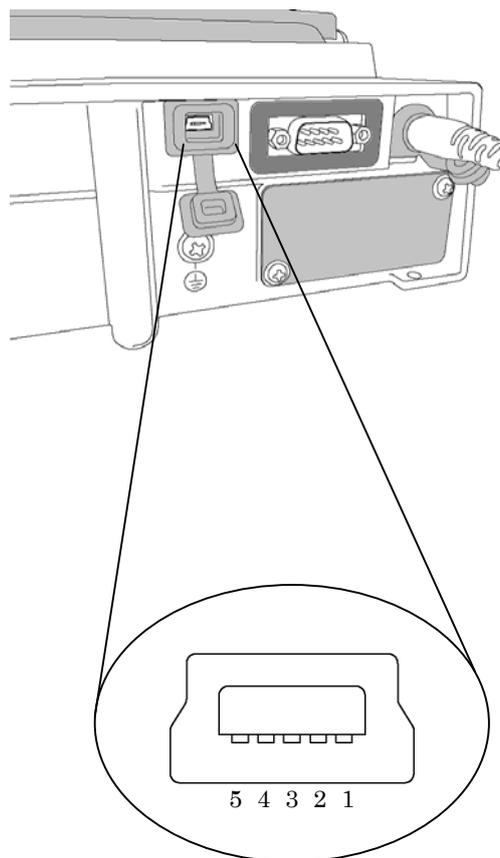
3. Connection diagrams

It is possible to connect the balance to peripheral devices, PCs, PLCs, etc. by using the RS-232C connector and the USB miniB connector which are provided as standard with the balance.

3-1. Connecting the balance to a printer

To print the weighing result measured with the balance on paper, connect a specialized balance printer (e.g. AD-8127 Compact Printer) to the device.

☐ Connect the balance with the printer using the RS-232C cable.
For settings when connecting the balance to the printer, refer to section 4, "Connecting to the printer".

RS-232C

Balance   Printer
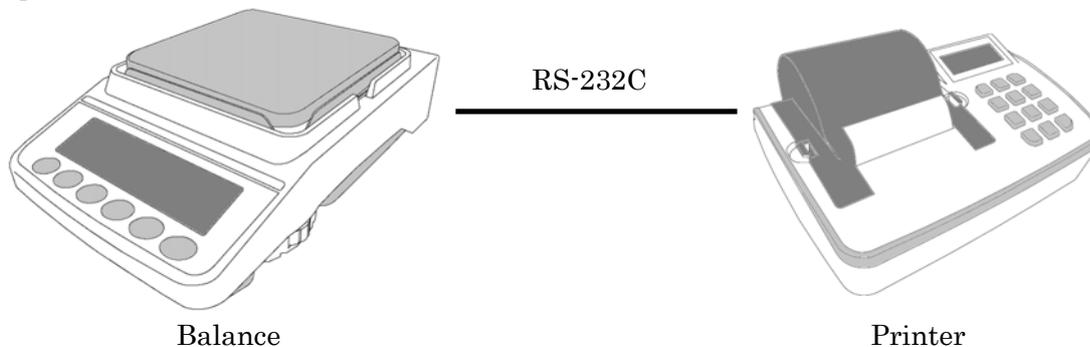
3-2. Connecting the balance to an external display unit

When confirming the weighing values or operating the balance with keys remotely, connect the specialized external display unit to the balance. The specialized external display unit consists of the external display unit AD-8920A (display only) and the external controller AD-8922A.

☐ Connect the balance to the external display unit using the RS - 232C cable.
For settings when connecting the balance and the external display unit, refer to section 5, "Connecting to the external display unit".

RS-232C

Balance   External display unit
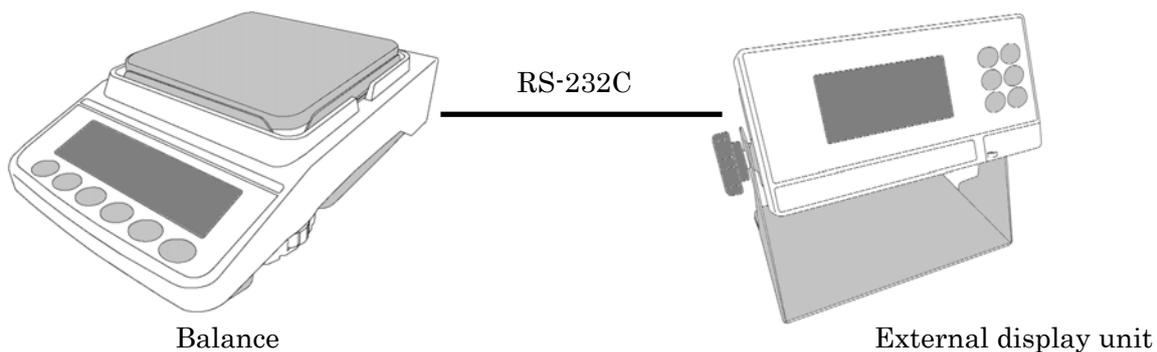
□ When connecting the balance to an external display unit and a printer, connect the balance with the external display unit (external controller AD-8922A only) with a RS-232C cable and connect the external display unit and the printer with a RS-232C cable.

| Balance | RS-232C | External display unit | RS-232C | Printer |
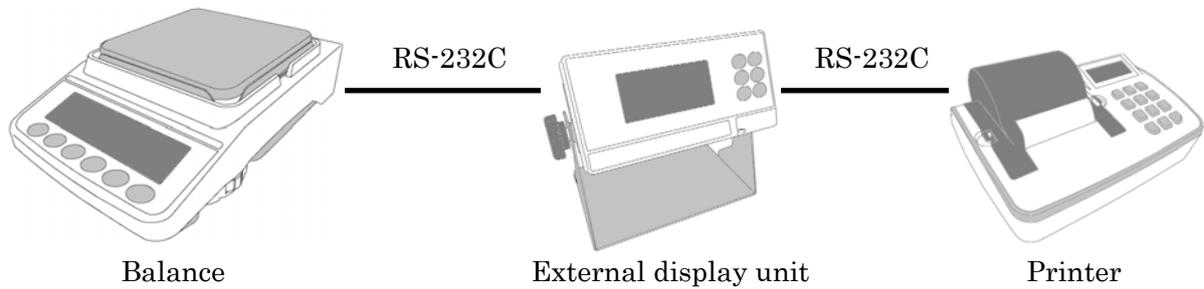
3-3. Connecting the balance to a PC or a PLC

When converting the weighing values of the balance into electronic data or when remotely controlling the balance, connect it to a PC or a PLC.

□ Connect the balance to a PC using a USB or an RS-232C cable.

| Balance | USB or RS-232C | PC |
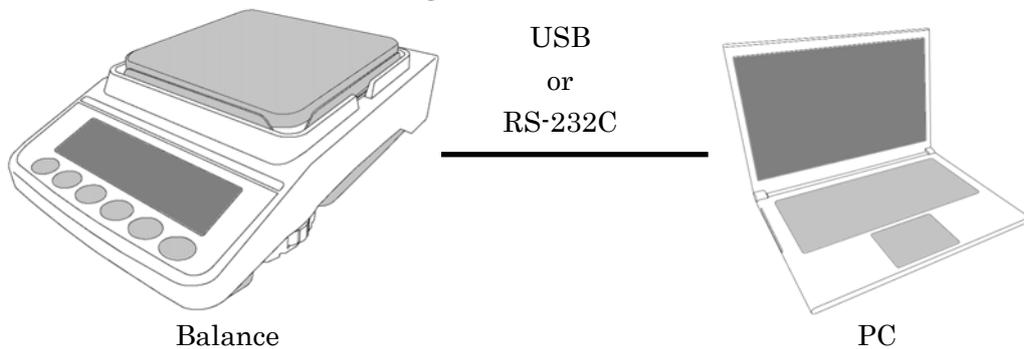
□ Connect the balance to a PLC using a RS-232C cable.

| Balance | RS-232C | PLC |
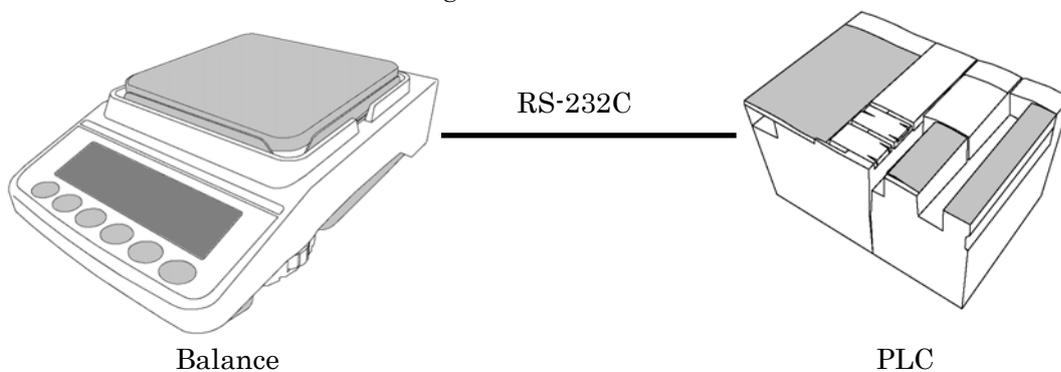
□ When connecting the balance to a PC and a printer, connect the balance to the PC with a USB cable and connect the balance to the printer with an RS-232C cable.

USB

Balance

RS-232C

PC
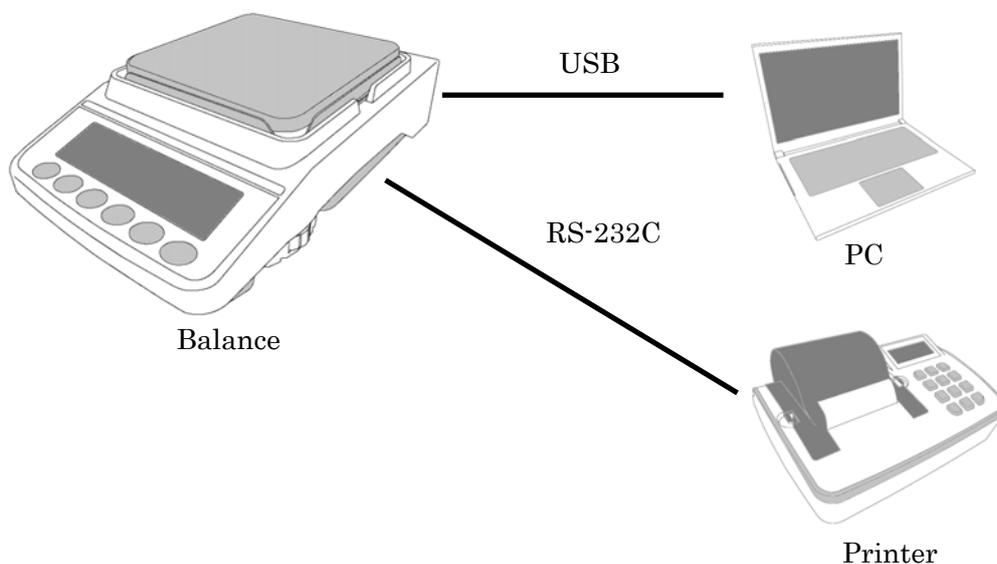
Printer

□ When connecting the balance to a PC and to the external display unit, connect the balance to the PC with a USB cable and connect the balance to the printer with an RS-232C cable.

USB

Balance

RS-232C

PC

External display unit
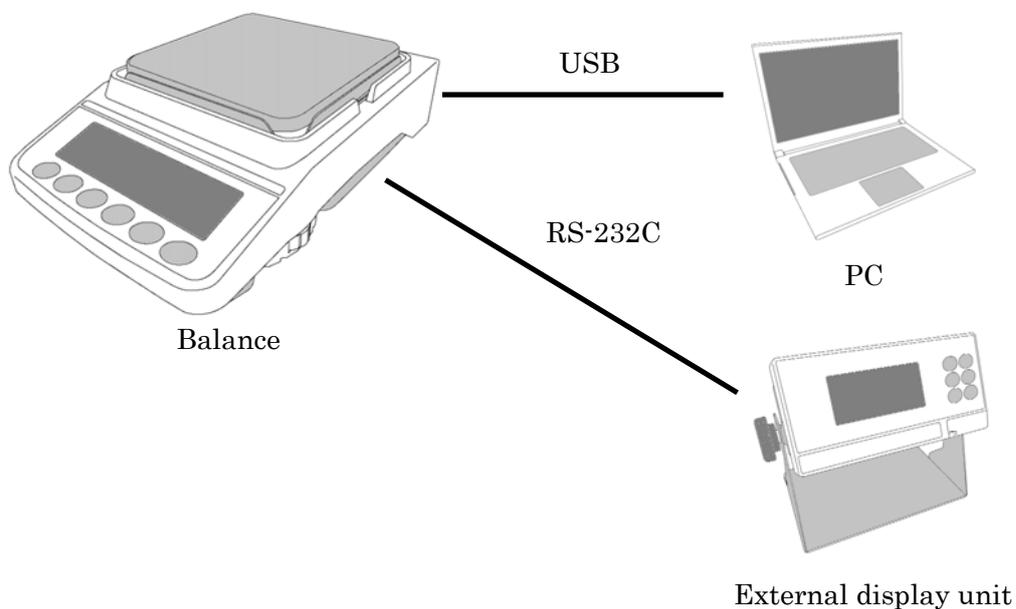
□ When connecting the balance with a PLC and the printer or the external display unit, in both cases you must use RS-232C cables. When the balance is equipped with the GXA–03 special option (2nd RS-232C cable, insulated type), connect the PLC with a cable to the RS-232C connector of the GXA-03, and connect the printer or the external indicator unit with a cable to the standard RS-232C connector of the balance.

RS-232C
(Insulated type)

RS-232C
(Standard)

PLC

Balance + GXA-03

Printer

RS-232C
(Insulated type)

RS-232C
(Standard)

PLC

Balance + GXA-03

External display unit
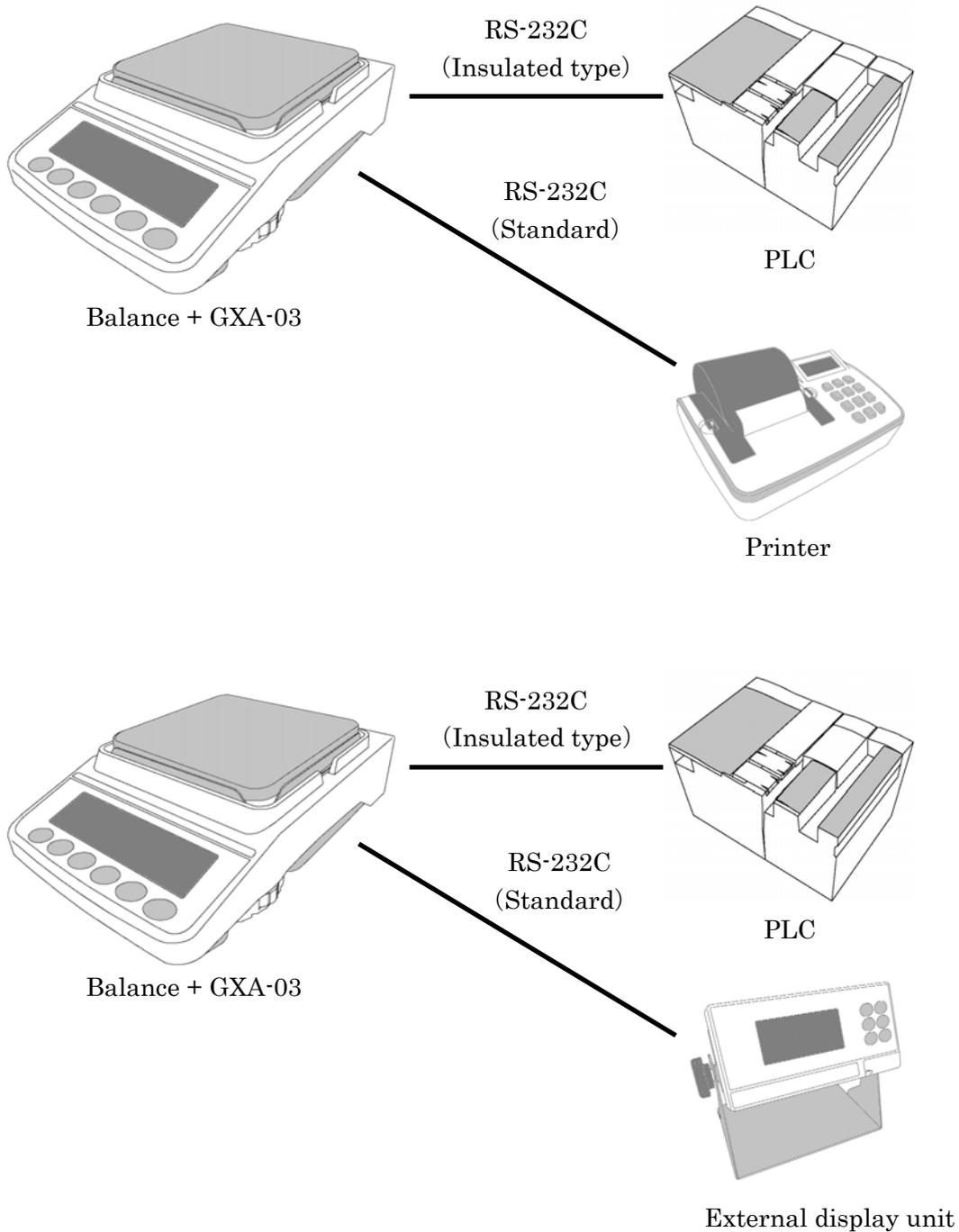
4. Connecting to the printer

When connecting the printer to the balance for printing measured values, configure the printer and the balance as follows according to these usage examples.

Internal settings of the printer

Usage example	AD-8127 Compact printer Printing mode settings
When printing values measured by the balance with the balance's PRINT key or its "Auto-print" mode.	EXT.KEY
When printing values measured by the balance with the printer's "Printing" key or its timer mode. When printing charts with the printer.	MANUAL AUTO TIMER CHART
When printing the balance's statistical calculation results. When printing the balance's GLP data output.	DUMP

□ Refer to the instruction manual of the AD-8127 for how to change internal settings of the AD-8127 compact printer.

Internal settings of the balance

Usage example	Balance MⒶdE Connection destination	Balance Prt Data output mode	Balance ㅏYPE Data format
When printing values measured by the balance with the balance's PRINT key or its "Auto-print" mode.	1	0, 1, 2, 4, 5	0
When printing values measured by the balance with the printer's "Printing" key or while in its timer mode. When printing charts with the printer.	1	3, 6	0
When printing the balance's statistical calculation results. When printing the balance's GLP data output.	1	0, 1, 2, 4, 5, 6	1

5. Connecting to the external display unit

When connecting the external display unit to the balance, configure the external display unit and the balance as follows according to these usage examples.

Internal settings of the external display unit and the balance

Usage example	AD-8920A Remote Display	AD-8922A Remote Controller out Output mode	Balance ModE Connection destination
When only displaying the balance's display value on the external display unit.	No setting	0, 1, 2	2
When printing with the PRINT key of the external display unit with the printer connected to it		1, 2	2
When printing with the printer's "Printing" key or while in its timer mode with the printer connected to the external display unit. When printing charts with the printer.		0	2

□ Refer to the instruction manual of the AD-8922A for how to change internal settings of the AD-8922A remote controller.

6. Connecting to a PC or a PLC

6-1. Quick USB mode

The quick USB mode is a function used to connect the balance with the PC using a USB cable to directly input the output data of the balance into PC software such as Excel or Word. Windows XP or later is supported.

Since the balance uses a standard Windows driver (HID), no installation of a special driver is necessary and communication is possible just by connecting the balance to a PC.

Caution
□ Quick USB is a one-way communication from the balance to the PC. It is not possible to send control commands from the PC to the balance.
□ Turn off the PC's screen saver and stand-by modes.

About internal settings
□ With the internal setting of $UFnc$ 0 (Quick USB ALL) all data is output including the header and units of the weighing data according to the output data format set in the internal setting (USB data format). $U-tP$
□ With the internal setting of $UFnc$ 1 (Quick USB NU) only the weighing data values are output.

Operating instructions (when sending weighing data using the balance's PRINT key)
1. Set the internal setting $UFnc$ of the balance to 0 (Quick USB ALL) or to 1 (Quick USB NU).
2. Connect the balance to a PC with the supplied USB cable.
3. When connecting for the first time, the PC will automatically start installing the driver.
4. Start up PC software (Excel, etc.) for transmitting the weighing data.
5. Set the keyboard input mode to half-width characters[A1]. In case of full-width setting activated the data will not be input correctly.
6. Move the cursor to the place you want to input the weighing data.
7. When you press the PRINT key on the balance, weighing data will be transmitted from the balance and input at the location of the cursor.
8. Disconnect the USB cable when finished.

6-2. Virtual COM mode

Virtual COM mode is a function used to connect the balance with the supplied USB cable and create a COM port on the PC side for bidirectional communication. Windows XP or later is supported. Except for Windows 10, when using for the first time, you need to install a special driver on the PC. For details on how to install the driver, please refer to "Installing the driver for the GX-A / GF-A series USB interface "Virtual COM mode" on our website (http://www.aandd.co.jp).

About internal settings
□ When using Virtual COM mode, please put the balance's internal setting $UFnc$ to 2 (bidirectional USB virtual COM).

6-3. RS-232C

The RS-232C interface of the balance is the DCE (Data Communication Equipment) that can be connected to a PC. The RS-232C cable used for connection is the straight type. If there is no RS-232C connector on the PC, please connect in USB Virtual COM mode.

6-4. WinCT data transmission software （USB Virtual COM mode or RS-232C）

When a PC is connected through a USB connection in virtual COM mode or with a RS-232C cable, weighing data can be easily received by the PC with the use of the WinCT data communication software for Windows. WinCT can be downloaded from our website (http://www.aandd.co.jp). Please refer to "WinCT setup procedures" and "WinCT operation manual" on our website (http://www.aandd.co.jp) for installation and setup.

There are 3 applications in WinCT: RsCom, RsKey and RsWeight.

RsCom
□ You can control the balance by sending a command to it.
□ Received data can be displayed and saved as a text file (.txt).
□ By executing the software multiple times, you can communicate with multiple balances.
□ It can be executed simultaneously with other applications. (Does not exclusively occupy the PC)
□ GLP output data can also be received from the balance.

RsKey
□ Weighing data from the balance can be input directly into another applications.
□ If input by keyboard (e.g. with Word or Excel) is possible, the type of application does not matter.
□ GLP output data from the balance can also be input.
□ The PC can be made into an external display for the balance through the use of the test display function.

RsWeight
□ Received data can be graphed in real time.
□ Parameters of received data such as maximum value, minimum value, average value, standard deviation, coefficient of variation, etc. can be calculated and displayed.

7. Data output

7-1. Data output mode

As for the balance's data output timing, it can be changed with the internal setting Prt (data output mode).

Key mode   **Internal setting** $dout$ Prt 0

If the PRINT key is pressed when the stable value mark is displayed, the weighing value will be output once.

At that time the displayed weighing value will blink once to indicate that it had been output.

Auto print A mode   **Internal setting** $dout$ Prt 1

When the weighing value exceeds the range specified by the internal setting $AP-P$ (auto print polarity) and the internal setting $AP-b$ (auto print width) from the standard "zero display" and the stable value mark is on, the weighing value will be output once. Also, if the PRINT key is pressed while the stable value mark is on, the weighing value will be output once.

At that time the displayed weighing value will blink once to indicate that it had been output.

      Related internal settings

      $dout$ $AP-P$ Auto print polarity

      $dout$ $AP-b$ Auto print width

Auto print B mode   **Internal setting** $dout$ Prt 2

When the weighing value exceeds the range specified by the internal setting $AP-P$ (auto print polarity) and the internal setting $AP-b$ (auto print width) from the standard "value previously displayed with a stable value mark" and the stable value mark is on, the weighing value will be output once. Also, if the PRINT key is pressed while the stable value mark is on, the weighing value will be output once. At that time the displayed weighing value will blink once to indicate that it had been output.

      Related internal settings

      $dout$ $AP-P$ Auto print polarity

      $dout$ $AP-b$ Auto print width

Stream mode   **Internal setting** $dout$ Prt 3

Regardless of the presence or absence of the stable value mark, weighing value will be output for each internal setting SPd (display rewrite cycle). When the internal setting is SPd 0 (5 times / sec), the output is at approximately 5.21 Hz.

      Related internal settings

      $bASFnc$ SPd Display rewrite cycle

      SiF bPS Baud rate

Caution

☐ Depending on the display rewrite cycle and the baud rate, all data may not be transmitted unless the baud rate is increased.

Key mode B mode   Internal setting $dout$ Prt 4

Regardless of the presence or absence of the stable value mark, when the PRINT key is pressed, the weighing value will be output once.

At that time the displayed weighing value will blink once to indicate that it had been output.

Key mode C mode   Internal setting $dout$ Prt 5

When the PRINT key is pressed and the stable value mark is displayed, the weighing value will be output once. In case the stable value mark is not displayed, the weighing value will be output once the stable value mark is displayed next time.

At that time the displayed weighing value will blink once to indicate that it had been output.

Interval mode   Internal setting $dout$ Prt 6

Regardless of the presence or absence of the stable value mark, values will be output at an interval of the internal setting int (interval time). By pressing the PRINT key data output is started and stopped by pressing it again during the data output.

       Related internal settings

       $dout$ int Interval time

       SiF bPS Baud rate

Caution

□   Depending on the interval time and the baud rate, all data may not be transmitted unless the baud rate is increased.

7-2. Weighing data format

As for the balance's weighing data output, for USB it can be changed by the internal setting U-tP (USB data format) and for RS-232C – by the internal setting ᴸᵞᵖᴱ data format).

Standard format A&D   RS-232C connection : internal setting   �5 ᵢF ᴸᵞᵖᴱ ᴼ
                             USB setting :   internal setting   ᵁ5ᵇ ᵁ-ᴸᵖ ᴼ

□ This is the standard format for sending data to peripheral devices.
□ Consists of 15 characters (excluding the terminator).
□ The condition of the data is indicated with a 2-character header.
□ The data is padded with polarity and zeros (filling the data's higher order's surplus part with zeros).
□ If the data is zero, the polarity is positive.
□ The unit consists of three characters.

S	T	,	+	0	0	1	2	3	.	4	5	_	_	g	CR	LF

Header   Data   Unit   Terminator

S	T	When stable
U	S	When unstable
Q	T	Counting mode when stable
O	L	When overloaded

_	means "space"

<CR> is the ASCII:0Dh code
<LF> is the ASCII:0Ah code
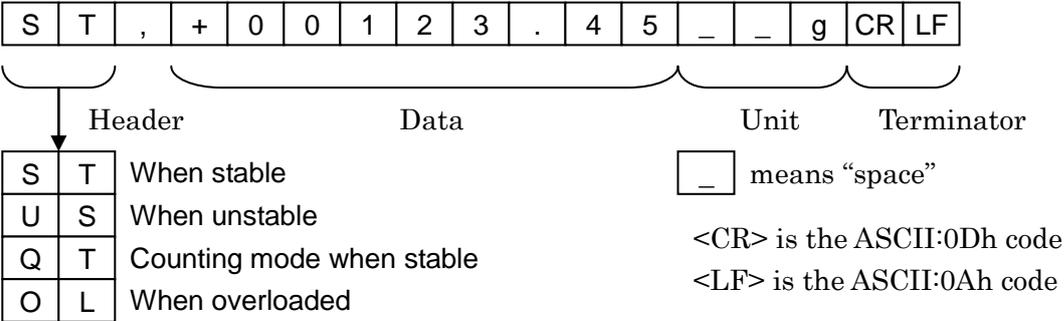
□ Printing pattern of the AD-8127 compact printer is as follows:

```
WT, +1234.56  g
```

DP format（Dump print）   RS-232C connection : internal setting   �5 ᵢF ᴸᵞᵖᴱ ╷
                                USB connection :   no function

□ This format is suitable for dump printing.
□ Consists of 16 characters (excluding the terminator).
□ The condition of the data is indicated with a 2-character header.
□ The polarity sign is added right before the data if the data is not overloaded or zero.
□ The data is zero-suppressed (leading zeros are replaced with spaces).
□ The unit consists of three characters.

W	T	_	_	_	_	+	1	2	3	.	4	5	_	_	g	CR	LF

Heade   Data   Unit   Terminator

W	T	When stable
U	S	When unstable
Q	T	Counting mode when stable

_	means "space"
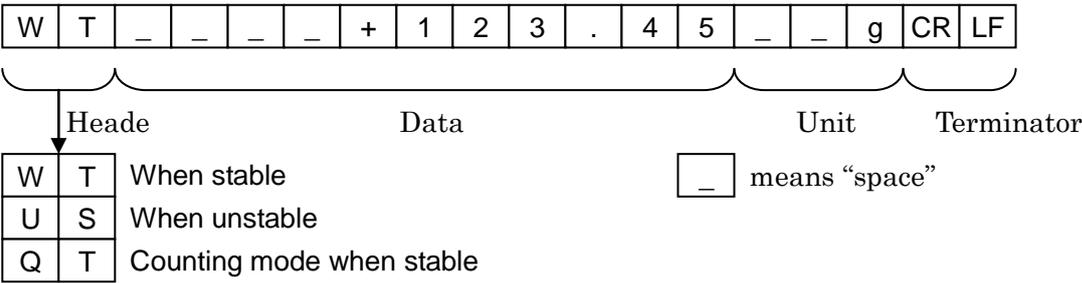
KF format

RS-232C connection : internal setting 5 ,F ヒ ЧΡΕ 己
USB connection : no function

□ This is the Karl-Fischer moisture meter format.
□ Consists of 14 characters (excluding the terminator).
□ Has no header characters.
□ The polarity sign (1 character) is placed before the data if the data is not overloaded or zero.
□ The data is zero-suppressed (leading zeros are replaced with spaces).
□ When stable, the unit is output. When not stable, the unit is not output.

| + | _ | _ | _ | 1 | 2 | 3 | . | 4 | 5 | _ | g | _ | _ | CR | LF |

Data   Unit   Terminator

| _ | means "space"

| _ | g | _ | _ | With the unit when stable
| _ | _ | _ | _ | No unit when unstable
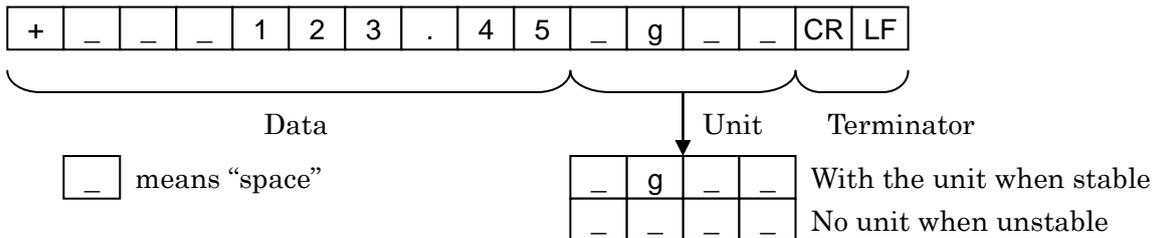
MT format

RS-232C connection : internal setting 5 ,F ヒ ЧΡΕ ∃
USB connection : no function

□ Used when connecting to devices manufactured by other companies. However, there is no guarantee of compatibility.
□ The length of data depends on the length of the unit
□ Has a 2-character header.
□ The data is zero-suppressed (leading zeros are replaced with spaces).

| S | _ | _ | _ | _ | _ | 1 | 2 | 3 | . | 4 | 5 | _ | g | CR | LF |

Header   Data   Unit   Terminator

S	_	When stable (Output with a command)
S	D	When unstable (Output with a command)
S	I	When overloaded
_	_	When stable (Output with the PRINT key)
_	D	When unstable (Output with the PRINT key)

| _ | means "space"
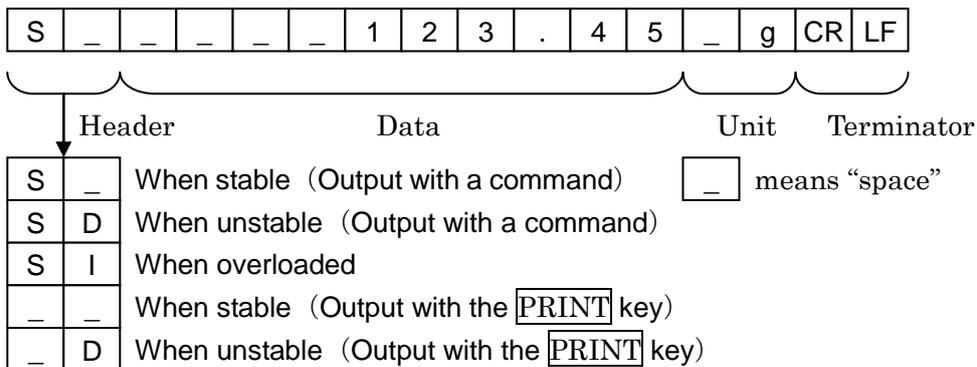
NU format

RS-232C connection : internal setting 5 ,F ヒ ЧΡΕ Ч
USB setting : internal setting USb U-ヒΡ |

□ This format outputs only numerical data.
□ Consists of 9 characters (excluding the terminator).
□ The data is padded with polarity and zeros (filling the data's higher order's surplus part with zeros).
□ If the data is zero, the polarity is positive.

| + | 0 | 0 | 1 | 2 | 3 | . | 4 | 5 | CR | LF |

Data   Terminator
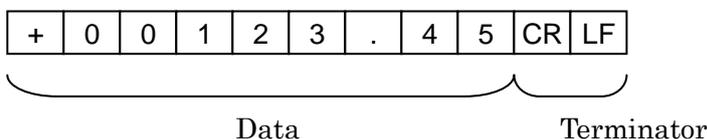
CSV format   RS-232C connection : internal setting S_iF $tYPE$ 5
                 USB connection : internal setting USb U-tP 2

☐ Separates the data of A&D standard format and the unit by a comma (,).

☐ Outputs the unit even when the data is overloaded.

☐ When the decimal point is set to comma (,), semicolon (;) will be used as the separator.

S	T	,	+	0	0	1	2	3	.	4	5	,	_	_	g	CR	LF

☐ When other data is added to the weighing value, all data will be displayed in one line.
  The display sample will be as follows if the ID number, data number, date and time are added.

```
SAMPLE-0123-4,No,012,2017/07/01,12:34:56,ST,+00123.45,  g
```

ID number	Data number	Date	Time	Weighing data

TAB format   RS-232C connection : no function
                 USB connection : internal setting USb U-tP 3

☐ This is a format, in which the separator of the CSV format is changed from comma to TAB.

S	T	TAB	+	0	0	1	2	3	.	4	5	TAB	_	_	g	CR	LF

<TAB> is the ASCII:09h code

7-3. Output examples of weighing data format

When stable

Display: 3142.06 g

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A&D	S	T	,	+	0	3	1	4	2	.	0	6	_	_	g	CR	LF	
DP	W	T	_	_	_	+	3	1	4	2	.	0	6	_	_	g	CR	LF
KF	+	_	_	3	1	4	2	.	0	5	_	g	_	_	CR	LF		
MT	S	_	_	_	_	3	1	4	2	.	0	6	_	g	CR	LF		
NU	+	0	3	1	4	2	.	0	6	CR	LF							

When unstable

Display: -295.87 g

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A&D	U	S	,	-	0	0	2	9	5	.	8	7	_	_	g	CR	LF	
DP	U	S	_	_	_		-	2	9	5	.	8	7	_	_	g	CR	LF
KF	-	_	_	_	2	9	5	.	8	7	_	_	_	_	CR	LF		
MT	S	D	_	_	_	-	2	9	5	.	8	7	_	g	CR	LF		
NU	-	0	0	2	9	5	.	8	7	CR	LF							

When overloaded (plus)

Display: E g

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A&D	O	L	,	+	9	9	9	9	9	9	9	E	+	1	9	CR	LF	
DP	_	_	_	_	_	_	_	_	E	_	_	_	_	_	_	_	CR	LF
KF	_	_	_	_	_	_	H	_	_	_	_	_	_	_	CR	LF		
MT	S	I	+	CR	LF													
NU	+	9	9	9	9	9	9	9	9	CR	LF							

When overloaded (minus)

Display: E g

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A&D	O	L	,	-	9	9	9	9	9	9	9	E	+	1	9	CR	LF	
DP	_	_	_	_	_	_	_	-	E	_	_	_	_	_	_	_	CR	LF
KF	_	_	_	_	_	_	L	_	_	_	_	_	_	_	CR	LF		
MT	S	I	-	CR	LF													
NU	-	9	9	9	9	9	9	9	9	CR	LF							

7-4. Other data formats

In addition to weighing data, other data can be added. Switch each internal setting on / off as necessary.

Data number   Internal setting *dout d-no 1*

- When the data memory function is used, the data number is output.
- Consists of 6 characters (excluding the terminator).

| N | o | . | 0 | 0 | 1 | CR | LF |

Data number   Terminator
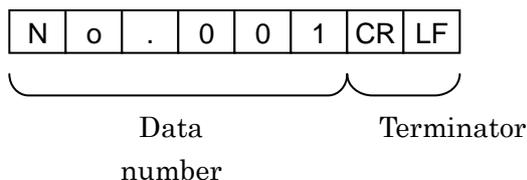
ID number   Internal setting *dout S-id 1*

- The ID number stored in the balance is output.
- Consists of 13 characters (excluding the terminator).

| S | A | M | P | L | E | - | 0 | 1 | 2 | 3 | - | 4 | CR | LF |

ID number   Terminator
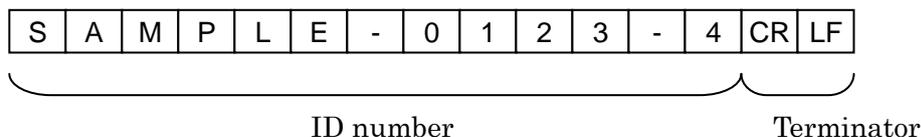
Date   Internal setting *dout S-td 2* or *3*

- The date is output from the clock data of the balance.
- The order of YYYY／MM／DD can be changed in settings.
- Consists of 10 characters (excluding the terminator).

| 2 | 0 | 1 | 7 | / | 1 | 2 | / | 3 | 1 | CR | LF |
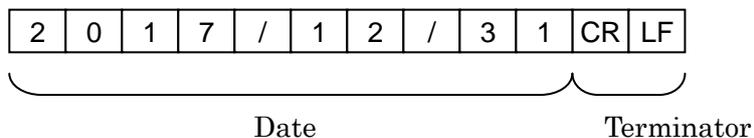
Date   Terminator

Time   Internal setting *dout S-td 1* or *3*

- The time is output from the clock data of the balance.
- 24-hour format.
- Consists of 8 characters (excluding the terminator).

| 1 | 2 | : | 3 | 4 | : | 5 | 6 | CR | LF |

Time   Terminator
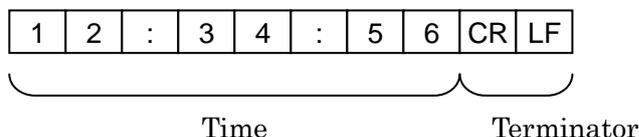
8. Commands

By sending a specified command from a PC or a PLC to the balance, you can control the balance such as by requesting weighing data, manipulating various keys and changing the setting value. To send a command to the balance, add a terminator (<CR> <LF> or <CR> in the [ːｒ L F] al setting   ） to the command character string.

8-1. Control commands

Commands to query weighing data

Command string	Function
Q	Requests the weighing data immediately
RW	Requests the weighing data immediately
SI	Requests the weighing data immediately
S	Requests the weighing data when stabilized.
<ESC>P	Requests the weighing data when stabilized.
SIR	Requests the weighing data continuously. (Stream output)
C	Cancels the S, <ESC>P or SIR command.

□ The Q, RW and SI commands behave the same.

□ The S and <ESC>P commands behave the same.

□ <ESC> : Escape code,   ASCII:1Bh code

Key control commands

Command string	Function
P	Same as the ON:OFF key
ON	Turns the display on.
OFF	Turns the display off.
CAL	Same as the CAL key : Calibration with built-in weight （GX-A Series） Calibration with a separate weight （GF-A Series）
EXC	Calibration with a separate weight （GF-A Series）
U	Same as the MODE key
SMP	Same as the SAMPLE key
PRT	Same as the PRINT key
R	Same as the RE-ZERO key （Semi-automatic zero point setting）
Z	Same as the RE-ZERO key （Semi-automatic zero point setting）
RZ	Same as the RE-ZERO key （Semi-automatic zero point setting）
T	Tares the balance
TR	Tares the balance
ZR	Zero （Setting the zero point）

□ The R, Z and RZ commands behave the same.

□ The T and TR commands behave the same.

Commands for presetting the tare value

Command string	Function
PT：＊＊＊＊.＊＊ g	Sets the tare value. The unit added is the unit that is output in the A&D standard format (3 characters). For the counting or percent mode, gram is used. In the case of setting the preset tare value to 1234.56 g, the input will be PT:1234.56 g. Values exceeding the weighing capacity cannot be set. Negative values cannot be used.
?PT	Requests the tare value. Outputs the tare value set by the PT, T or TR: command.

Command to control piece count

Command string	Function
UW：＊＊＊＊.＊＊ g	Sets the unit mass value (weight of 1 piece) The unit added is the unit that is output in the A&D standard format (3 characters). In the case of setting the unit mass value to 1.23 g, the input will be UW:1.23 g. Values exceeding the weighing capacity cannot be set. Negative values cannot be used.
?UW	Requests the mass unit value.
UN：mm	Changes the unit mass registration number. Input values from 01 to 50 before mm.
?UN	Outputs the unit mass number of the selected unit mass.

Commands to control the comparator function

Command string	Function
HI：＊＊＊＊.＊＊ g HH：＊＊＊＊.＊＊ g LO：＊＊＊＊.＊＊ g LL：＊＊＊＊.＊＊ g	Sets the upper limit value. Sets the second upper limit value. Sets the lower limit value. Sets the second lower limit value. The unit added is the unit that is output in the A&D standard format (3 characters). In the case of setting the upper limit value to 567.89 g, the input will be HI:567.89 g. Values exceeding the weighing capacity cannot be set.
?HI	Requests the upper limit value.
?HH	Requests the second upper limit value.
?LO	Requests the lower limit value.
?LL	Requests the second lower limit value.

□ To use a comparator command, set it to the internal setting ＣＰ ｉｎ ０ (digital input, upper / lower limits) or ＣＰ ｉｎ １ (Weighing input, upper / lower limits).

Command to control the data memory function

Command string	Function
?MA	Outputs all data in memory.
?MQnnn	Outputs weighing data with the data number nnn. Input a value from 001 to 200 before nnn.
?MX	Outputs the number of weighing data in memory.
MD：nnn	Deletes weighing data with the data number nnn. Input a value from 001 to 200 before nnn.
MCL	Deletes all data in memory.

Commands for setting time and date

Command string	Function
TM：＊＊：＊＊：＊＊	Sets time. In the case of setting time to 12h 34 min 56 sec, the input will be TM:12:34:56. Do not set non-existing time values.
DT：＊＊／＊＊／＊＊	Sets date. In the case of setting date to Jan 1, 2017, the input will be DT:17/01/23. Do not set non-existing date values.
?TM	Requests time setting.
?DT	Requests date setting.

Commands to request other data

Command string	Function
?T	Requests the tare weight value. The tare value set by T, TR command is output.
?ID	Requests ID number.
?SN	Requests serial number.
?TN	Requests device name.

8-2. The <AK> code and error codes

When the internal setting $ErCd$ 1 (AK、error code on) is set、the balance always responds to reception of all commands sent from a PC or a PLC. Communication reliability is improved by checking the responding code.

When the internal setting $ErCd$ 1 (AK、error code on) is set, the balance responds with the following.

□ When sending a command requesting various data to the balance, if the balance cannot transmit the requested data, it sends an error code (EC, Exx). If the balance can output the requested data, the requested data will be sent.

□ When sending a controlling command to the balance, if the balance cannot execute the command, it sends an error code (EC, Exx). If the balance can execute the command, it sends the <AK> code.
   <AK> code is the ASCII 06h code.

□ The commands below are processed by the balance, so it will send the <AK> command not only when a command is received, but also at the end of processing. If the process does not end normally, the balance sends an error code (EC, Exx), in which case the error is canceled with the CAL command.

ON command	Display on
P command	Display on / off（However, only when already on）
R、Z、RZ commands	Re-zero（Semi-automatic zero point setting）
T、TR commands	Tare the balance
ZR command	Zero（Setting the zero point）
CAL command	Calibration with built-in weight（GX-A Series）
	Calibration with a separate weight（GF-A Series）
EXC command	Calibration with a separate weight（GX-A Series）

8-3. Command usage examples

In this example in order to force an output of the <AK> code the internal setting $ErCd\ 1$ (AK、error code on) is set. <AK> code is the ASCII 06h code.

Example of the ON command (display on)

PC side	Time	Balance side	
ON command			Display off, stand by
O N CR LF →			
← AK CR LF			Command received
			All segments are displayed（processing）
← AK CR LF			Command completed
	↓	0.00 g	Zero display
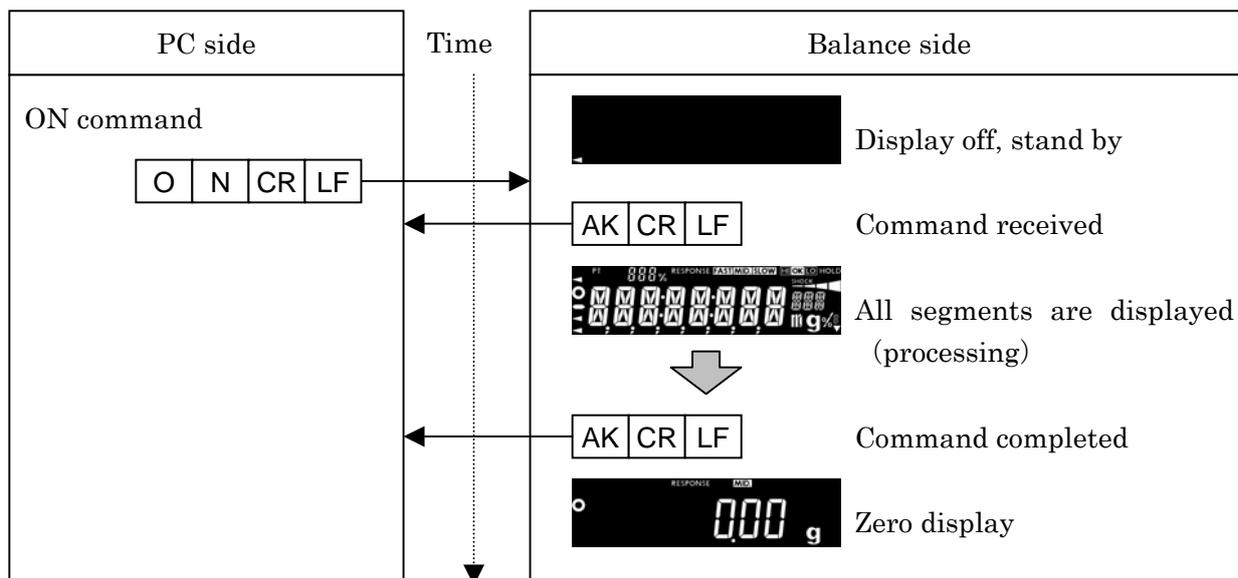
Example of the R command (Re-zero)

PC side	Time	Balance side	
R command		0.12 g	Before execution
R CR LF →			
← AK CR LF			Command received
		. g	Waiting for re-zero stability（processing）
← AK CR LF			Command completed
	↓	0.00 g	Zero display
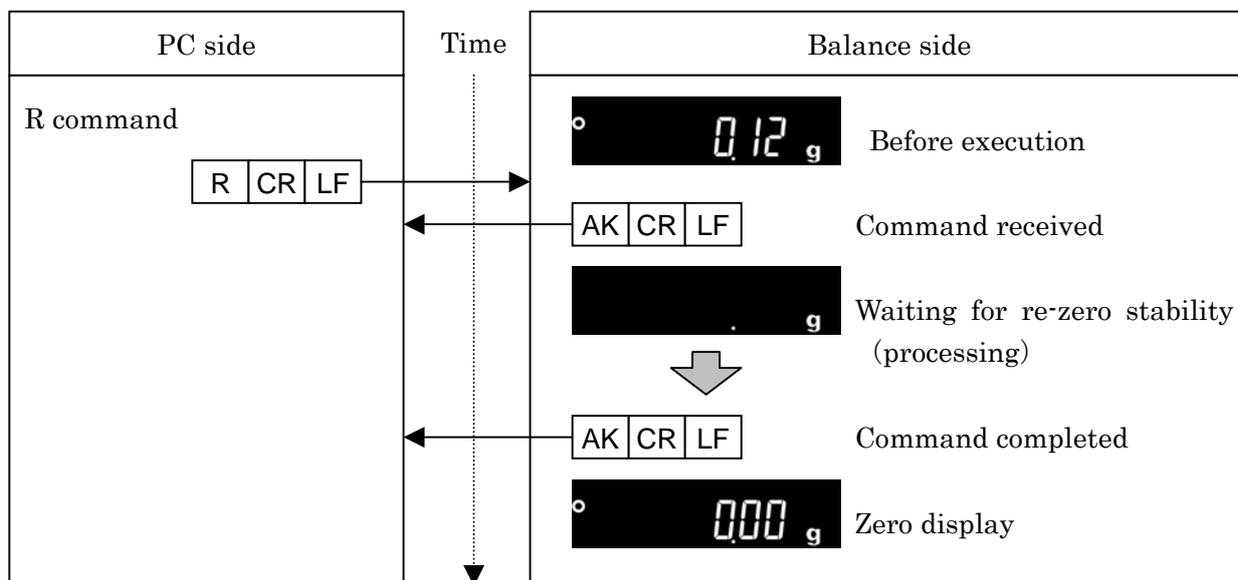
Example of the CAL command   (GX-A Series) Calibration with built-in weight)

PC side	Time	Balance side
CAL command | C	A	L	CR	LF			Before execution `0.00 g`
		Command received ← AK CR LF
		Executing（processing） `CAL.`
		Command completed ← AK CR LF
		Zero display `0.00 g`
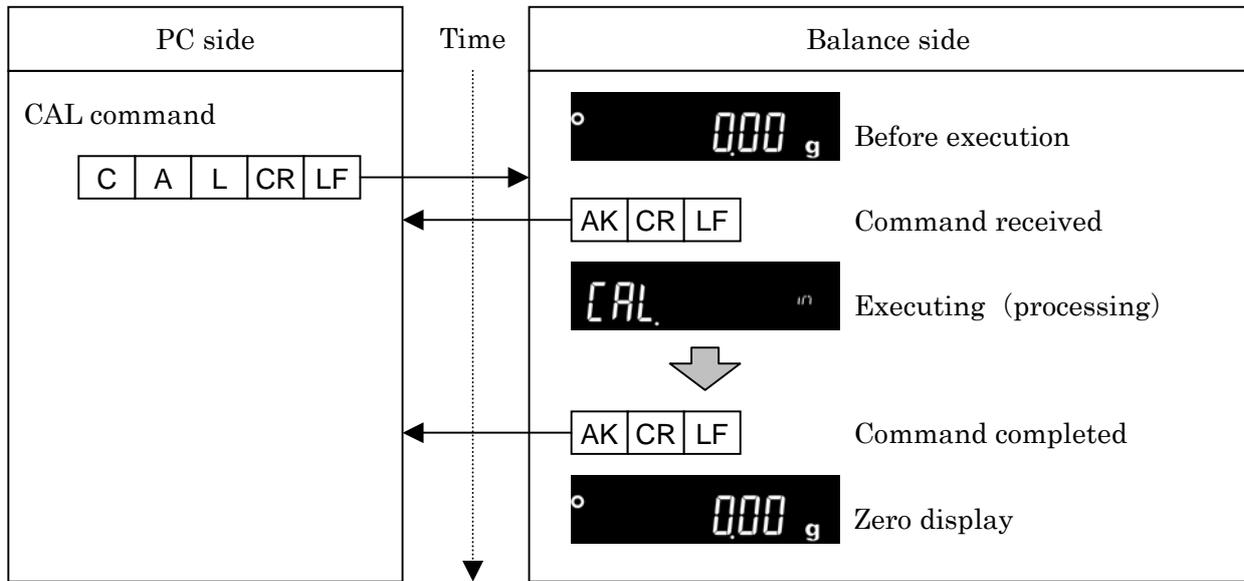
□ For an example of the CAL command for the GF-A series, see the example of the EXC command.

Example of error code output of the R command (re-zero)

PC side	Time	Balance
R command 	R	CR	LF			Before execution `0.12 g`
		Command received ← AK CR LF
		Waiting for re-zero stability （processing）, time up due to instability
		← E C , E 1 1 CR LF
CAL command | C	A	L	CR	LF			Error code output `Error 1` Error display
Or stand by for 5 seconds		Zero display `0.12 g`

Example of the EXC command Calibration with a separate weight（GF-A Series）

PC side	Time	Balance side

EXC command

E	X	C	CR	LF

→ `0.00 g` Before execution

← `AK CR LF` Command received

`CAL  0` Waiting for the zero setting

PRT command

P	R	T	CR	LF

→

← `AK CR LF` Command received

`CAL  0` Inputting the zero setting （processing）

← `AK CR LF` Command completed

`2000` Waiting for weight value input

Action： **Place calibration weight**

PRT command

P	R	T	CR	LF

→

← `AK CR LF` Command received

`2000` Inputting the value of the weight （processing）

← `AK CR LF` Command completed

`End` Waiting for weight removal

Action： **Removing the weight**

`. g` Waiting for re-zero stability （processing）

← `AK CR LF` Command completed

`0.00 g` Zero display

Example of measuring using a container

PC side	Time	Balance side

R command

`R | CR | LF` →

`0.12 g` — Before execution

← `AK | CR | LF` — Command received

`. g` — Waiting for re-zero stability (processing)

← `AK | CR | LF` — Command completed

`0.00 g` — Zero display

Action: **Place a container**

T command

`123.45 g` — Measured value of the container

`T | CR | LF` →

← `AK | CR | LF` — Command received

`. g` — Waiting for container subtraction stability (processing)

← `AK | CR | LF` — Command completed

`0.00 g` — Zero display

Action : **Place sample**

S command

`100.00 g` — Measured value of sample

`S | CR | LF` →

← `S | T | , | + | 0 | 1 | 0 | 0 | 0`
`. | 0 | 0 | _ | _ | g | CR | LF` — Net value

?PT command

`? | P | T | CR | LF` →

← `P | T | , | + | 0 | 0 | 1 | 2 | 3`
`. | 4 | 5 | _ | _ | g | CR | LF` — Tare value

Example of setting a negative target value and filling with a sample until the display becomes zero

PC side	Time	Balance side

PC side

R command

R	CR	LF

PT command
Target weight is 500g

P	T	:	5	0	0	.

0	0	_	_	g	CR	LF

Balance side

Action: | Place a container |

| AK | CR | LF | Command received

.   g   Waiting for re-zero stability (processing)

| AK | CR | LF | Command completed

0.00 g   Zero display

| AK | CR | LF | Command received

-500.00 g   Container weight value Displayed with the negative sign

Action: | Fill with sample |

-234.56 g   Filling

0.00 g   When 500.00g of sample is filled

9. Error codes

9-1. Error codes list

Error codes and how to resolve

Error code	Description and how to resolve
EC,E00	**Communications error** A protocol error occurred in communications. Check the format and the baud rate.
EC,E01	**Undefined command error** An undefined command was received. Check the command.
EC,E02	**Not ready** The command received cannot be processed. e.g. The balance received a **Q** command, which requested the weighing data, but it was not in the weighing mode with the display on. e.g. The balance received a **Q** command while processing a RE-ZERO command. Adjust the timing of transmitting the command.
EC,E03	**Timeout error** The internal setting of the timeout parameter is set to $\mathsf{t\text{-}UP\ 1}$ (limit set to 1 second for the command timeout), so the balance did not receive the next command within the time limit of one second. Check the communication.
EC,E04	**Excess characters error** The balance received excessive characters in a command. Check the command.
EC,E06	**Format error** The format of the received command is incorrect. e.g. The data is numerically incorrect. e.g. Alphabet characters are input instead of values. Check the command.
EC,E07	**Setting value error** The received data exceeds the range of values that the balance can accept. Check the parameter values range of the command.
EC,E11	**Weighing values stability error** Because the weighing value is unstable, it is not possible to rezero or calibration. Improve the environment of the location where the balance is installed. Send a CAL command or wait 5 seconds to reset the error.

Error code	Details and ways to address
EC,E16	**Built-in weight error** There was no change in load even when the built-in weight was raised and lowered. Perform the weighing operation from the beginning without placing anything on the pan.
EC,E17	**Built-in weight error** There was an error in the mechanism of raising and lowering the built-in weight. Perform the weighing operation from the beginning.
EC,E20	**Calibration weight error (heavy)** The calibration weight is too heavy. Check the nominal calibration weight value. Send a CAL command or wait 5 seconds to reset the error.
EC,E21	**Calibration weight error (light)** The calibration weight is too light. Check the nominal calibration weight value. Send a CAL command or wait 5 seconds to reset the error.

10. The UFC function

By using the UFC (Universal Flex Coms) function, it is possible to arbitrarily output contents of your choice when outputting the weighing data. You can also output a character string when printing a barcode with a label printer or the like.

In order to use the UFC function, it must be set to internal setting $UFC \quad 1$ (UFC function on).

10-1. UFC program commands

To select the output format to use, send the program command from the PC and store it in the balance. The stored output format is saved even when the balance is turned off.

How to create program commands

☐ The maximum number of characters of a program command is 32 characters per line (including the terminator) with the total maximum being 384.

☐ First, add the PF, command.

☐ Program commands are combined in comma-delimited or space-separated form, but they can be omitted to reduce the number of characters. However, the comma after the PF command cannot be omitted.

List of program commands

Command	Contents	Example of output
PF,	UFC command header It is appended to the beginning of the program command.	
$MN	Manufacturer name	A & D
$TY	Model name	GX-10002A
$SN	Serial number	T1010101
$ID	ID number	SAMPLE-1234-5
$DT	Date	2017/01/23
$TM	Time of Day	12:34:56
$WT	Weight data	+1234.56 g
$GR	Gross data (total amount)	+1234.56 g
$NT	Net data (net)	+234.56 g
$TR	Tare data (tare)	+1000.00 g
$PC	Number data	+1234 PC
$UW	Single data	+0.12 g
$CP	Comparator result	HI
$CM	Comma	,
$SP	Space	_ (ASCII 20h code)
$CR	<CR>	ASCII 0Dh code

| $LF | <LF> | ASCII 0Ah code |

□ Enclose any ASCII code string in single quotation marks. The character strings that can be output are alphanumeric characters and symbols. In addition, the single quotation marks themselves are enclosed in two single quotation marks.
   Example: To output the character string ABC: 'ABC'
            To output the character string 'ABC': '"ABC"'

□ To output the ASCII control code, enter '# + 2 hexadecimal characters'.
   Example: To output <EOT> (04h): # 04

□ Spaces ($ SP), <CR> ($ CR), and <LF> ($ LF) can be repeated with numbers by adding '* + numbers (up to 2 characters)' after the command.
   Example: To output 12 spaces: $ SP * 12
            To output 9 <CR>'s : $ CR * 9

□ When sending a program command of two or more lines, adding '&' at the end of one line the balance will judge the next line as the continuation of the program command.

□ The balance sends an error code if there is a problem after receiving a program command and sends an <AK> code if there is no problem. <AK> code is ASCII 06h code.

□ WinCT-UFC Data communication software is available for inputting program commands. WinCT-UFC can be downloaded from our website (http://www.aandd.co.jp).

Output example 1

```
NET
       +2000.00  g
TARE
        +345.67  g
GROSS
       +2345.67  g
```

Description

PF, command, character string "NET", line break

Space × 5, net data, line break

Character string "TARE", line break

Space × 6, tear data, line break

Character string "GROSS", line break

Example of program command

PF,'NET',$CR,$LF,&

$SP*5,$NT,$CR,$LF,&

'TARE',$CR,$LF,&

$SP*6,$TR, $CR,$LF,&

'GROSS', $CR,$LF,&

$SP*5,$GR,$CR,$LF

Terminator

Output example 2

```
2017/01/23 12:34:56
SAMPLE        ABC-123
WEIGHT   +3456.78  g
```

Content

PF, command, date, time, line break

Character string "SAMPLE ABC-123", line break

Character string "WEIGHT   ", weight data

Example of program command

PF,$DT,$TM,$CR,$LF,&

'SAMPLE   ABC-123',$CR,$LF,&

'WEIGHT   ',$WT,$CR,$LF
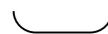
Terminator

11. Internal settings

By changing internal settings of the balance, you can customize balance usage. The contents of the settings are saved even when the AC adapter is unplugged and they are effective until set again. In the internal settings menu structure each setting entry is placed in its classification item and one setting value is registered for each setting entry.

11-1. How to set

Operation keys and indication

○	The ○ mark is displayed for the currently active setting values.
SAMPLE (¹/₁ₒd)	Press and hold while the weighing value is being displayed to enter the internal settings menu. (the classification item menu) Then move between items in the internal settings menu.
RE-ZERO (→0←)	Change the setting value (by +1). When it exceeds the maximum set value, it returns to 0.
PRINT (⊙)	Enter the settings menu from the classification items menu. Input the value and move to the next classification item.
CAL (▼)	In the settings menu push to cancel the input value and move to the next classification item. In the classification menu push to complete internal settings and return to the value indication screen.

Procedure for changing settings

1. Press and hold the SAMPLE key while the weighing value is displayed, release the key when bASFnc is displayed.
2. Continue to the classification item to be set with the SAMPLE key.
3. Enter into the classification item currently displayed with the PRINT key. The first setting item is displayed.
4. Use the SAMPLE key to toggle between the setting item to be set.
5. The value of the setting item currently displayed key can be increased by 1 with the RE-ZERO key. Keep pressing the RE-ZERO key until you reach the value you would like to set.
6. Repeat steps 4 and 5 to change other setting item(s) within the same classification item.
   If you want to move to another category, continue to step 7.
7. To confirm (register) the setting of the current classification item, press the PRINT key. The setting value is saved and you proceed to the next classification item.
   To cancel the setting of the current classification item, press the CAL key. The set value is canceled and you proceed to the next classification item.
8. Repeat from step 2 to make settings in another category.
   To finish configuration, press the CAL key. You will return to the weighing screen.

Configuration example

Example of setting "Time/Date output" to "outputting Time/Date" and "Data format" to "DP format".

Start, weighing display

Keep pressing（Procedure 1）

Classification item

bASFnc

Press several times（Procedure2）

Setting item

dout → PRINT **°Prt** *KEY*

(Procedure 3)

Press several times
(Procedure 4)

Changing the setting value

°S-td *OFF* → RE-ZERO **S-td** *D/T*

Press twice（Procedure 5）

(Procedure7)

PRINT

End

S iF → PRINT **°ModE** *PC*

(Procedure3)

Press several times（Procedure 4）

°tYPE *RAW* → RE-ZERO **tYPE** *DP*

Press once（Procedure 5）

(Procedure7)

PRINT

End

USb

(Procedure 8)

CAL

Completion、weighing display

11-2. List of items (communication entries only)

This is a list of items related to communication of internal setting values. For other items, refer to the GX-A / GF-A instruction manual.

Classification item	Setting item	Setting value	Contents, usage	
bASFnc : *CP bEEP*			Refer to the GX-A / GF-A instruction manual	
dout Data output	*Prt* Data output mode	▪ *0* Key mode	Data output with the PRINT key when the weighing value is stable	
		1 Auto print A mode (reference = zero point)	Data output of a stable weighing value when it exceeds the range of *AP-P* and *AP-b* in relation to zero.	
		2 Auto print B mode (reference = previous stable value)	Data output of a stable weighing value when it exceeds the range of *AP-P* and *AP-b* in relation to previous stable value.	
		3 Strem mode	Output every time when the display value is renewed	
		4 Key mode B mode (immediate output)	Data output regardless of stability / instability with the PRINT key	
		5 Key mode C mode	Data is output when stable with the PRINT key and if unstable, it is output once is has stabilized	
		6 Interval mode	Data output after every cycle set by the *int* setting	
	AP-P Auto print Polarity	*0* Only plus	When greater than reference value	
		1 Only minus	When smaller than reference value	
		▪ *2* Bipolarity	Regardless of the value size compared with reference value	
	AP-b Auto print difference	▪ *0* 10 digits	Difference from reference value	
		1 100 digits		
		2 1000 digits		

□ "▪" Factory setting.

□ "1 digit" stands for a smallest displayed order. In case of GX-303A 1 digit is 0.001g.

Classification item	Setting item	Setting value	Contents, usage	
dout Data output (Cont.)	*dAtA* Data memory function	▪ *0*	No used	
		1	Stores unit mass	
		2	Stores weighing data, and calibration data	
	int Interval time	*0*	Every measurement	Used when outputting with intervals set in *Prt 6*
		▪ *1*	Every 2 seconds	
		2	Every 5 seconds	
		3	Every 10 seconds	
		4	Every 30 seconds	
		5	Every 1 minute	
		6	Every 2 minutes	
		7	Every 5 minutes	
		8	Every 10 minutes	
	d-no Data number output	▪ *0*	Do not output	Refer to "7-4. Other data formats"
		1	Output	
	5-td Time/Date output	▪ *0*	Do not output	Refer to "7-4. Other data formats"
		1	Output time	
		2	Output date	
		3	Output date and time	
	5-id ID number output	▪ *0*	Do not output	Refer to "7-4. Other data formats"
		1	Output	
	PUSE Data output pause	▪ *0*	Off	Select interval before data output
		1	1.6-second pause	
	At-F Auto feed	▪ *0*	Off	Select line feed (paper feed) after data output
		1	Leave one line open	
	inFo GLP output	▪ *0*	Do not output	
		1	Output	
	Ar-d Auto re-zero	▪ *0*	Off	Select re-zero after data output
		1	On	
	UFC UFC function	▪ *0*	Off	Refer to "10. The UFC function"
		1	On	

□　"▪" Factory setting.

Classification item	Setting item	Setting value		Contents, usage	
5 ,F Serial interface	ModE Connection destination	■ 0	PC	tYPE 0 or 1	
		1	Printer		
		2	External display	tYPE 0 and stream output	
	bP5 Baud rate	0	600 bps		
		1	1200 bps		
		■ 2	2400 bps		
		3	4800 bps		
		4	9600 bps		
		5	19200 bps		
		6	38400 bps		
	btPr Data bit, parity bit	■ 0	7 bit EVEN		
		1	7 bit ODD		
		2	8 bit NONE		
	CrLF Terminator	■ 0	CR LF	CR: ASCII 0 Dh code LF: ASCII 0 Ah code	
		1	CR		
	tYPE Data format	■ 0	A&D Standard format	Refer to "7-2. Weighing data format"	
		1	DP format		
		2	KF format		
		3	MT format		
		4	NU format		
		5	CSV format		
	t-UP Timeout	■ 0	No limit	Select waiting time during command reception	
		1	Limited to 1 second		
	ErCd AK、error code	0	Off	Refer to "8-2. The <AK> code and error codes"	
		■ 1	On		
USb USB Interface	UFnc USB operation mode	■ 0	Quick USB ALL	See "6-1. Quick USB mode" See "6-2. Virtual COM mode"	
		1	Quick USB NU		
		2	Bidirectional USB virtual COM		
	U-tP USB Data format	■ 0	A&D standard format	Refer to "7-2. Weighing data format"	
		1	NU format		
		2	CSV format		
		3	TAB format		
AP Fnc ⋮ CS in				Refer to the GX-A / GF-A instruction manual	

□ "■" Factory setting.

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