ViBRA
Measure the Future

Built-in Weight Measuring Sensor

U F Series

Instruction Manual

IMPORTANT

- To ensure safe and proper use of the balance, please read this manual carefully.
- After reading this manual, store it in a safe place near the balance, so you can review it as needed.

SHINKO DENSHI CO., LTD.

340015M21

Introduction

Thank you for purchasing our UFseries.
To ensure smooth and efficient use of this product, please read this manual carefully before starting use. After reading, please store it with care for future reference when needed.

	• Be sure to follow the instructions in this manual when you install and operate this product and during maintenance and inspections. • SHINKO DENSHI CO., LTD. accepts no responsibility for any injury or damage caused because of failure to follow instructions in this manual or due to incorrectly using or modifying the product without permission.

- The balance (built-in weight measuring sensor) you have purchased cannot be used for trading transactions or as legal proof in a court of law.
- When installing, operating, or performing maintenance and inspections on this product, give sufficient attention not only to the descriptions in this manual and labels on this product but also any safety precautions.
- This manual is copyrighted by SHINKO DENSHI and may not be reproduced in whole or in part without prior permission in writing.
- If you have any questions about this manual or need more detailed information, please have the model name (type) and the manufacture number ready and contact the retailer from whom the balance was purchased for assistance.
- Please understand that some parts of this manual might not match the actual product due to modifications or other such changes.
- Descriptions in this manual are subject to change without notice for purposes of product improvement.
- ViBRA is a registered trademark of SHINKO DENSHI CO., LTD.

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1 How to use this manual

Please read this instruction manual carefully to fully understand the contents before use.
Hazards and damage resulting from incorrect use of this product are indicated by the following categories.
The drawings shown below indicate the category of instructions you must comply with.
Be sure to follow the instructions below to prevent bodily injury and/or material damage.

Symbol	Meaning
 DANGER	This symbol indicates the possibility of death or serious injury and a high probability of imminent danger.
 WARNING	This symbol indicates the possibility of death or serious injury.
 CAUTION	This symbol indicates the possibility of injury or only physical damage.
	This symbol indicates that performing a certain action is “prohibited.”
	This symbol indicates that always performing a designated action is “mandatory.”
Note	This symbol is used to urge the reader to be extra careful or to emphasize certain information.
Reference	This symbol is used for the information that can be used as reference when operating the product.

2 Precautions for use

2-1 Basic Precautions

■ This section describes general precautions to be taken when using the product.

DANGER

	Never disassemble, modify, or repair the product • This may cause malfunctions or emit excess heat. • Heat emissions might lead to an explosion or fire. • Request a repair from the retailer where you purchased the product.
	Do not use any power supply other than DC24V power supply. • Using a non-specified power supply may cause malfunctions or excess heat. • Heat generation may lead to an explosion or fire.
	Do not install the product in locations where there is the possibility of leakage of flammable gas such as gasoline or thinner. • This device does not have an explosion-proof structure. Should flammable gas leak and remain around this device then explosions or fires might occur.
	Do not operate the power supply with wet hands. • Connecting or disconnecting the power plug or operating the power switch with wet hands might cause electric shocks, short circuits, or corrosion.

CAUTION

	Do not use the product in environments with a high ambient temperature or humidity. • Doing so might cause electrical shocks or short circuits. • The operating temperature and humidity range of this product are between 10 to 30°C and 80%rh or lower.
	The DC24V power supply line for this device should only be used with this device and kept separate from other 24 volt DC driven devices for the following reasons. • This device might not operate incorrectly due to strong noise intruding from power supply lines of other DC24V motor-driven devices. • This device might not start correctly due to surge current from other DC24V motor-driven devices. • Other DC24V motor-driven devices might not operate correctly due to the circuit design of this device.
	When selecting the switching power supply current-carrying capacity of the dedicated DC24V power supply line, use approximately 0.7A per device as a general guide (device might not start up at a current-carrying capacity of less than 0.7A). • This device might not start properly if the power supply current-carrying capacity to too low.

CAUTION

	■**Do not strike the diaphragm or packing section of the weight measuring sensor with a sharp object.** • This might make a hole, through which water or dust could penetrate into the device.
	■**Do not perform high-pressure washing of the diaphragm or packing section of the weight measuring sensor.** • This might allow water to penetrate into the device.
	■**Do not put the weight measuring sensor in water.** • This may allow water to penetrate into the device and lead to malfunctions.
	■**Do not move the weight measuring sensor during weighing.** • When the weight measuring sensor is moved during weighing, the zero point or span may change. • When the weight measuring sensor is moved with a container or tare attached to it, a large inertial force is generated internally which might drastically reduce the durability. This might operate improperly in particular when the weight measuring sensor rapidly accelerates or decelerates rapidly.
	**Place any motor-driven devices or units having moving parts at least 20mm away from the weight measuring sensor by 20mm.** • Placing magnetic material (such as iron) near the weight measuring sensor may generate an error in the measured weight value.
	For accurate mass weighing, a warm-up of 1 hour or longer is required. • The weight value measured right after power-on might contain an error. Do not use the unit until after warm-up is fully complete.
	Ground the switching power supply line used with the dedicated DC24V power supply of this device. • This will prove effective in improving the device noise immunity. • This will prove effective for preventing electric shock and ensuring safety.
	Attach and ground a noise filter upstream of the switching power supply used with the dedicated DC24V power supply for this device. • This will prove effective for improving the device noise immunity.
	Ground the indicator and weight measuring sensor of this device. • This will prove effective for improving the device noise immunity.
	■**Load or unload the sample gently.** • Do not weigh an object by dropping it onto the weighing pan or weighing jig. Though the weight measuring sensor has a built-in overload protection mechanism and thus sufficient shock resistance, it might malfunction due to impacts from repeated dropping.
	Put this product in a package when relocating it. Before relocating a unit that has this product built in it, remove this product from the unit and put this product in the package that came with it. If the device is relocated without removing it from a unit, it might malfunction due to impacts during shipping.

2-2 Precautions for embedding the device

This section describes precautions to be taken especially when embedding this device into a unit.

WARNING

⊘	■**When securing the weighing pan or tare to the installation boss, do not apply a turning force or pressing load to it that is higher than the allowable values.** When a force higher than the allowable value is applied, the mechanical section may become damaged.
!	■**Completely debug automated equipment before embedding the device in that equipment.** After debugging and handling of the automated equipment and various positioning has been completed, embed the actual product (weight measuring sensor) in that unit and then operate it. Using the product before debugging is complete might damage the product.

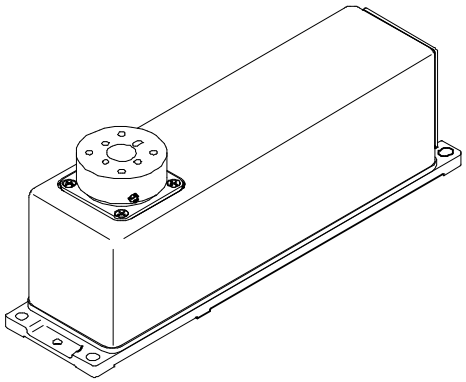
CAUTION

⊘	■**Do not install the device in a place where air blows from an air conditioner.** Weighing may become difficult due to the effect of the wind or the temperature may become unstable causing weighing errors.
	■**Install the device away from direct sunlight.** The temperature of the weight measuring sensor might become unstable which causes inaccurate weighing.
!	■**Adjust the level of the installation location to ensure the weight measuring sensor will be installed on a level surface.** Weighing errors will occur if not level.
	■**Calibrate the weight measuring sensor after the main unit is installed.** (1) Be sure to calibrate the unit after it is relocated. (2) After that, periodically recalibrate the weight measuring sensor.
	■**Place motor-driven devices and electromagnetic solenoids at least 50mm away from the weight measuring sensor.** The unit might be affected by magnetic material that makes it unsuitable for weighing such as magnetic sources including permanent magnets. However, it is okay to place the weight measuring sensors in close contact with each other.
	■**Eliminate static electrical charges.** (1) When an insulating material such as resin is used for a tare or container, the weighed value might be wrong due to effects from static electrical charges. Use a glass windshield, a resin windshield with conductive filler, or a metal container. (2) To remove the static charges, ground the weight measuring sensor to the device chassis.
	■**When IP65 performance is required, be sure to use waterproof cables and connector plugs (optional).** • Using a non-waterproof type will not satisfy protection class IP65 conditions.
	■**Positioning of the weighing jig** • When attaching a positioning pin to determine the position of the weighing jig, use a taper pin whenever possible to protect the weight measuring sensor. If using a parallel pin is unavoidable then allow some room in the gap for inserting and removing the pin.

3 Product configuration

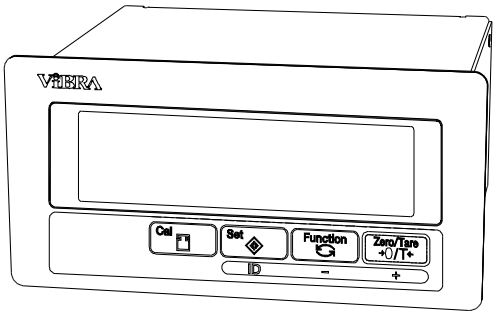
This product is composed of the following units. Should you find any missing or damaged units, contact the reseller from which this balance was purchased.
The weight measuring sensor and the indicator can also be purchased separately.
For more information on the options, refer to "Appendix 1."

■ Weight measuring sensor



☐ Accessories
Instruction Manual (this document)

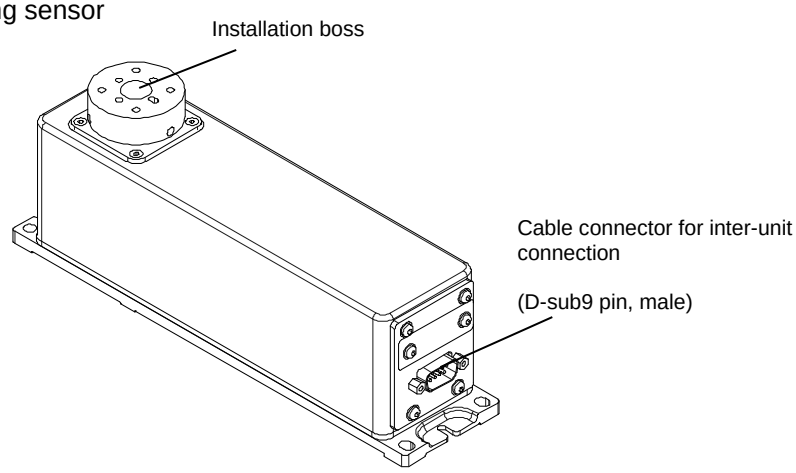
■ Indicator (sold separately)



☐ Accessories
Panel mount clip

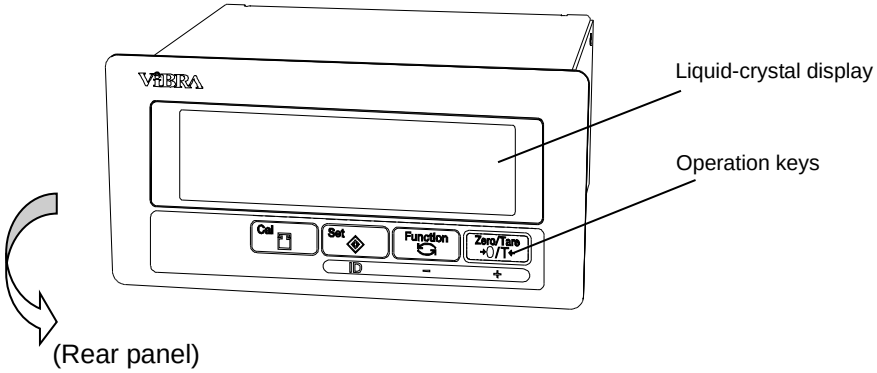
4 Names of parts

■ Weight measuring sensor

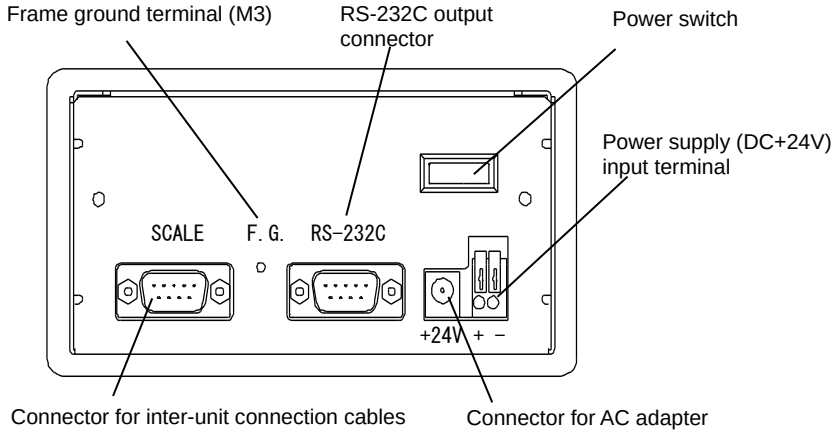


■ Indicator

(Front panel)



(Rear panel)



(Indicator power input terminals)

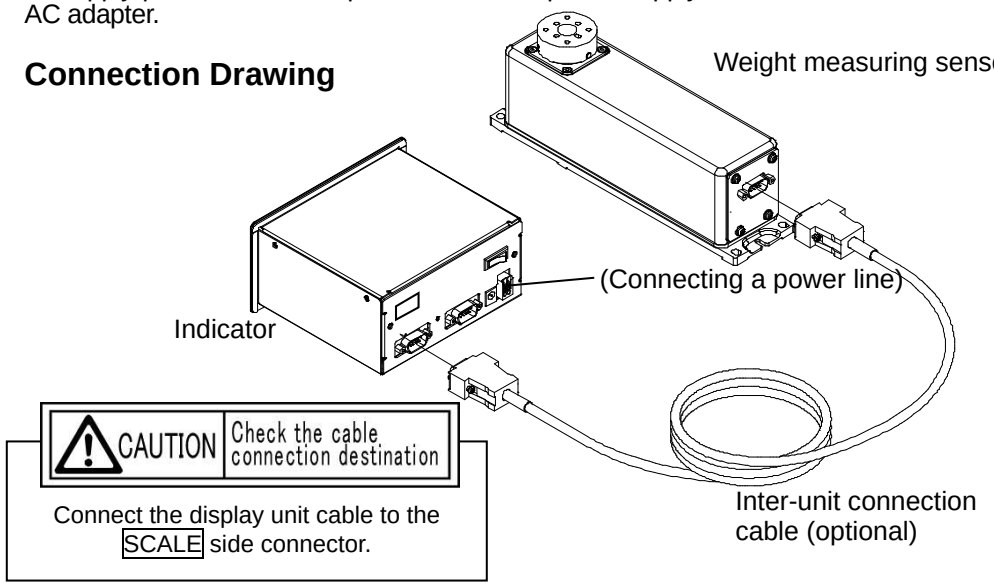
Terminal No.	Signal name	Input/output	Function/Remarks
+	DC24V	Input	Power +24V
-	GND	-	Power ground

5 Connecting the main unit and embedding it in the equipment

5-1 Connecting the main unit

Connect the indicator and the weight measuring sensor by using an inter-unit connection cable.
Tighten the cable clamping screws securely so that the cable will not come loose from the connector.
To supply power, connect a power line to the power supply terminal block or use an optional AC adapter.

Connection Drawing

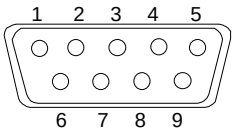


Reference	Use an optional inter-unit connection cable to connect the weight measuring sensor to the indicator.

Indicator SCALE connector pin assignment

D-Sub9 pin

Terminal No.	Signal name	Input/output	Function/Remarks
1	DC24V	Output	Power +24V
2	TXD	Output	RS-232C transmission*1
3	RXD	Input	RS-232C transmission*1
4	GND	-	Power ground
5	SG	-	Signal ground
6	EXT.TARE	Output	External tare
7	FG	-	Frame ground
8	A	I/O	RS-485 A*2
9	B	I/O	RS-485 B*2



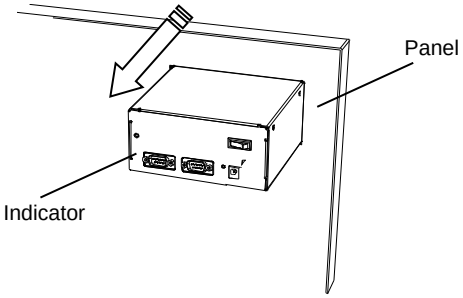
SCALE connector
D-Sub9 pin, male

*1 Customers are not allowed to use the RS232C terminal on the "SCALE" connector.
*2 Please use a twisted-pair cable.
To find pin assignments for the weight measuring sensor, refer to Section 8-1 "Connector terminal No. and their corresponding functions."

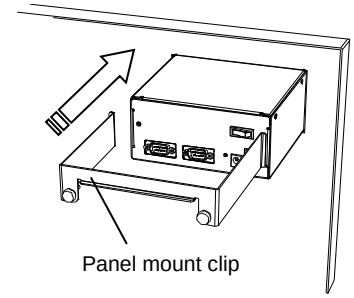
5-2 Embedding the indicator

The indicator can be installed on any panel by using the panel mount clip provided with the product if required. The supported panel thickness is 4.5mm or less.

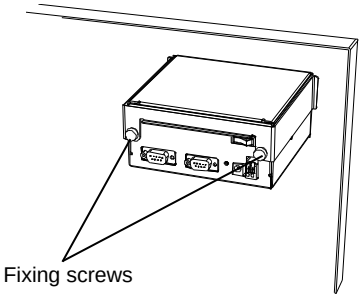
1 **Fit the indicator into the panel.**



2 **Attach the panel mount clip.**



3 **Secure the panel mount clip.**



Tighten the clamping screws manually.
Check that the indicator is clamped securely.

5-3 Connecting the power supply

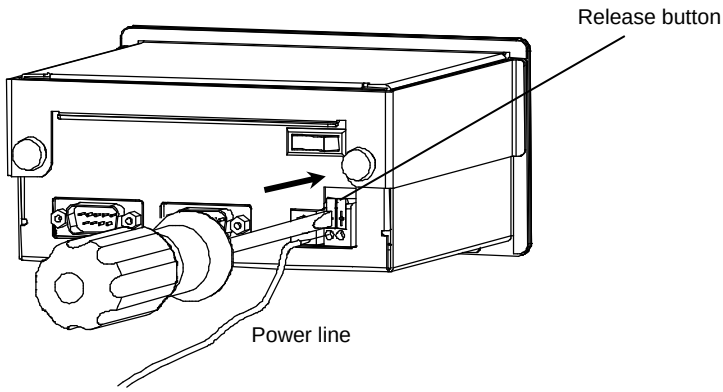
5-3-1 Connecting the power line

Available power line gage sizes

Solid wire	ϕ1.0 (AWG26) to ϕ1.2mm(AWG16)
Twisted wire	0.3mm^2 (AWG22) to 0.75mm^2 (AWG20) Stand diameter: ϕ 0.18 or more

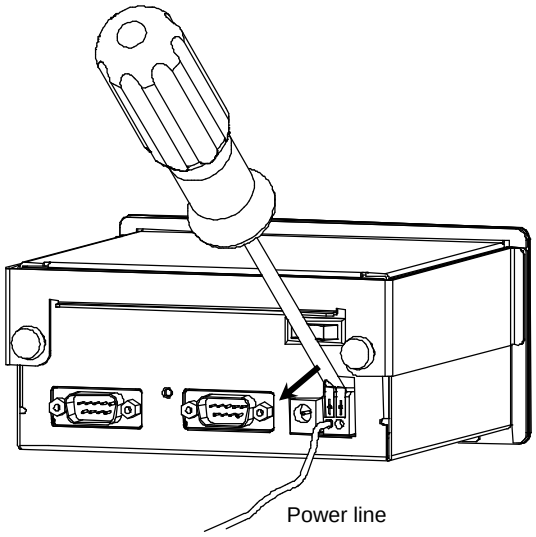
1 Insert the power line into the power supply terminal block.

Push in the release button on the terminal block by using a flat-blade screwdriver or similar tool and then insert the power line.
The exposed wire length is 10mm.



2 Fix the power line.

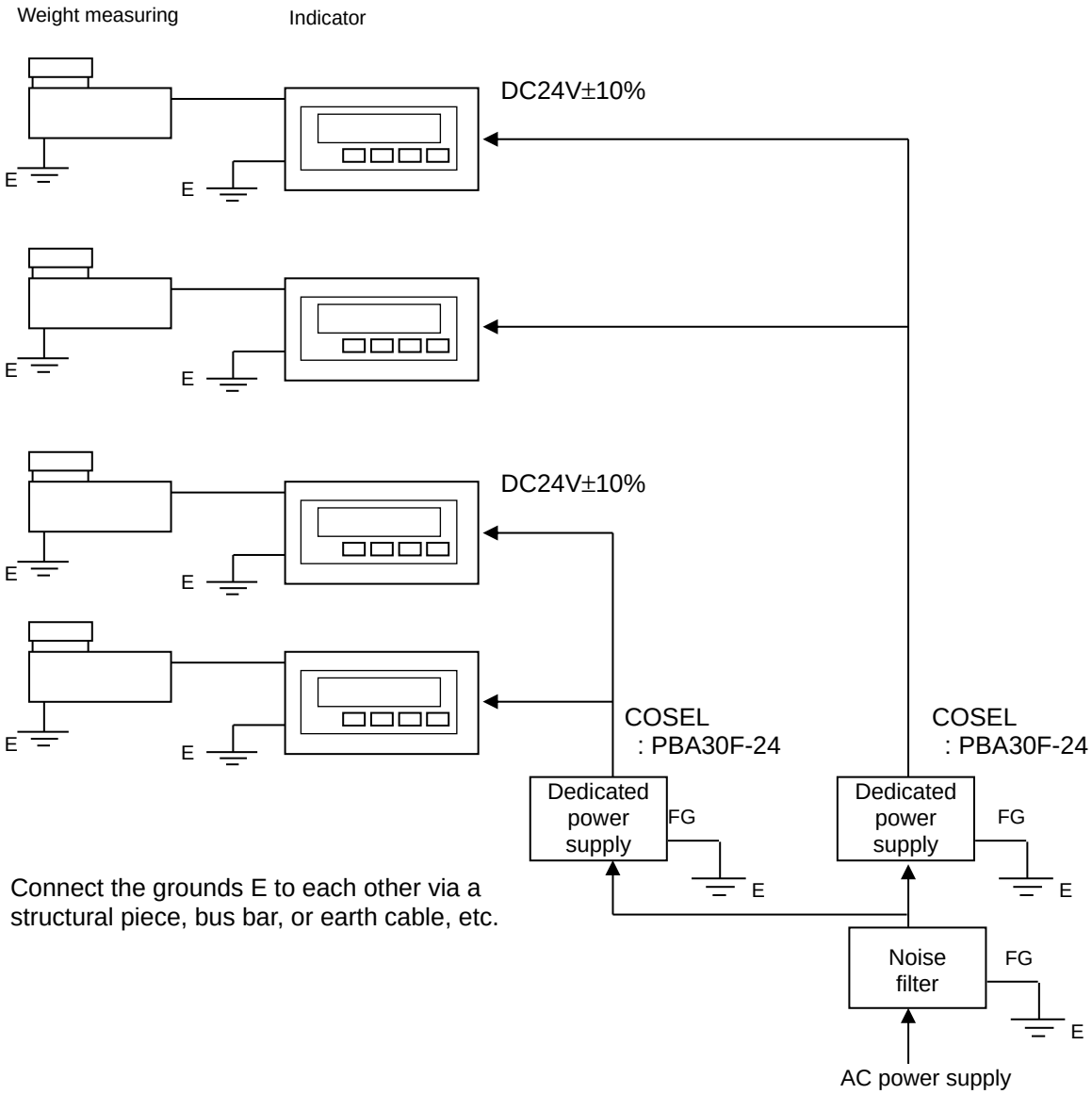
The power line is locked by returning the release button back to the front position by using a flat-blade screwdriver, etc.
To disconnect the power line, push in the release button again by using a flat-blade screwdriver or similar tool.



5-3-2 Power supply specifications

	Description	Remarks
Surge (inrush) current of the power supply	Surge current up to about 2A is generated.	
Rated power supply voltage / Current consumption	DC +24V ±10% / 0.1A	
Recommended power supply	COSEL PBA15F - 24 (24V / 0.7A)	When 1 unit is driven
	COSEL PBA30F - 24 (24V / 1.3A)	When 2 units are driven

5-3-3 Recommended connection when using 24V switching power supply

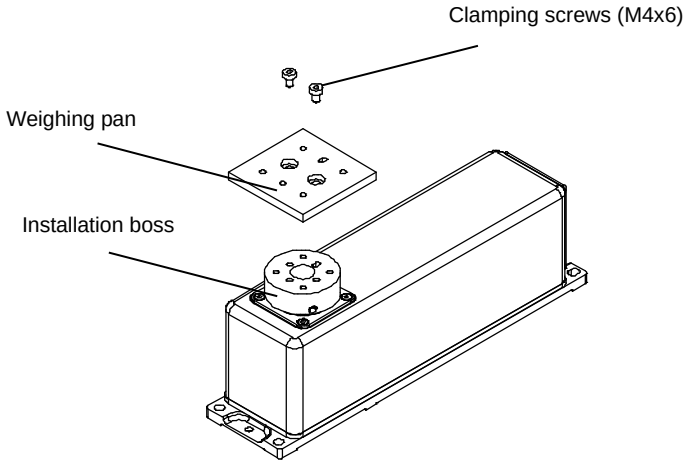


* Connect the grounds E to each other via a structural piece, bus bar, or earth cable, etc.

5-4 Installing the weighing pan

Before use, attach the optional weighing pan or any weighing jig of 100g or heavier to the installation boss.

■ Example of weighing pan installation



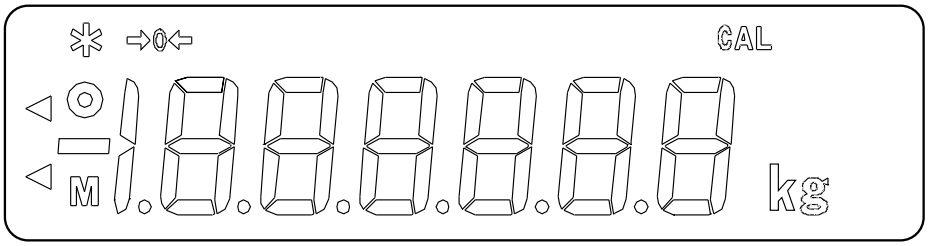
Note	If the mass of the weighing pan or weighing jig is heavier than the range of the zero point adjustment to be performed at power-on, then tare is performed at power-on. When tare is performed, the available weighing range narrows by the mass of the tare, which means that "available weighing range = capacity - mass of the tare."
	To prevent damage to the mechanical section, do not apply a torque of 0.5N-m or higher to the clamping screws to attach to the weighing boss during tightening. Also, do not push down on the clamping screws and bolts too strongly.

6 Operations via the indicator

6-1 Indications and operation keys

The optional indicator and inter-unit connection cable are required.

Display pattern



(Some symbols may not be used)

Symbols

Symbol	Description
◎	Stable symbol (indicates that weighing is stabilized)
⇨0⇦	Zero point indication
▭	Minus indication
M	Stability wait
g	Gram unit
✻	Data is being output
◁ (upper)	Tare is in progress
CAL	Calibration is in progress

Functions of operation keys

Operation key		Function
Cal	Cal key	[Press] Starts the span adjustment.
Set	Set key	[Press] Ends the function settings. [Press] Specifies an ID for multi-drop connection.
Function	Function key	[Press and hold] Calls up a function. [Press] Selects an item during function setting. [Press] Changes and ID for multi-drop connection.
Zero/Tare →0/T←	Zero/Tare key	[Press] Performs zero point adjustment or tare to set the display to zero. [Press] Selects a function item. [Press] Changes an ID for multi-drop connection.

6-2 Zero point adjustment / tare

Zero point adjustment/tare

1 Press the Zero/Tare key during weighing.

The zero point adjustment or tare is automatically performed depending on the load applied to the weight measuring sensor. At this time, "->0<-" is lit while the zero point is displayed.

Differences between zero point adjustment and tare

	Zero point adjustment	Tare
Working load	Approx. 1.5% or less of the capacity	Approx. 1.5% or more of the capacity
Measured value after the operation	Gross weight	Net weight
Available weighing range against the capacity	Unchanged	Becomes narrower by the weight of the tare
	Available weighing range = capacity (100% of the capacity)	Available weighing range = capacity - weight of the tare
Symbol	None	"◁ (upper)"

"**o-Err**" is displayed when the total weight of the samples is more than the capacity.
When the samples are added after the tare, only the (net) weight of the added samples is displayed.

Reference	In addition to the method of pressing the Zero/Tare key, zero point adjustment and tare can also be executed by using the RS-232C tare command (refer to "1. Zero adjustment/tare command" in Section 7-4-2) or by using an external tare input from the connector (refer to Section 7-1 "Connector terminal No. and their corresponding functions").

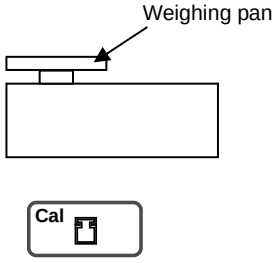
6-3 Calibration (span adjustment)

Calibrating the weight measuring sensor is called "span adjustment" and is required for high-precision weighing.
Since the weight measuring sensor is affected by gravitational acceleration, it should be recalibrated for each place where used. Calibration is also required when the device is not used for a long time or the display becomes inaccurate.
The span adjustment performs calibration by using a weight (span adjustment using an external weight).

Note	• This page describes the span adjustment via operations on the indicator. For span adjustment without using the indicator, refer to "3. Span adjustment command" in Section 7-4-2 "Command formats." • Switch on the device one hour before the span adjustment to adapt it to the room temperature. • Check that the function is set to "**5. CA 3**" (refer to Section 6-5-10 "Operation settings for span adjustment.")

Executing the span adjustment

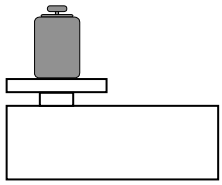
1 Start the span adjustment.



Perform the span adjustment while the weighing pan or weighing jig that you obtained is attached to the device.

Press the Cal key when a weight is displayed.
"**CAL.EXt**" is displayed.
After a while, the display changes to " **on 0** " and starts flashing.

2 Mount a weight.



When the display changes to "**on F.S.**," mount a weight.
The display changes to "**on F.S.**" and starts flashing.

3 Finishing span adjustment

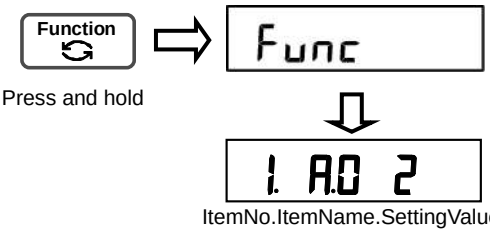
After " **End** " is displayed, the display automatically returns to the weight display.

Reference	• To abort the span adjustment, press any key other than the Function key. • When " **1-Err** " is displayed, it indicates that the mass of the weight used is much lighter than the capacity of the weight measuring sensor. Use the weights of more than 50g for UF-620 and of more than 300g for UF-3200. • When " **2-Err** " is displayed, it indicates that the difference in displayed weight between the weight measuring sensor and the weight exceeds 1%. • When an error message is displayed, then calibration is not performed. • To obtain more precise calibration, use a weight with a mass heavier than the actual use range. • If the jig attached to the weighing boss is heavy, a weight that is the same as the capacity cannot be used.

6-4 Basic function operations

This device has a lot of functions. Pressing "functions," allows making settings according to the current situation.

1 Call up the function mode.



Press and hold the Function key until " **Func** " is displayed.
The first function item is displayed.

A function is displayed in the format of "ItemNo.ItemName.SettingValue."

2 Select a setting item.

Press the Function key to select an item for which settings are needed.

Each time the Function key is pressed, these items are displayed sequentially.
After the last item is displayed, the first item is displayed again.

3 Select a setting value.

Press the Zero/Tare key to select a setting value.
Every time the Zero/Tare key is pressed, the setting value changes.

After the last setting value is displayed, the first setting value is displayed again.

4 Record the setting value.

Press the Set key.
The setting is recorded and the function ends.

The device returns to the measurement mode.

Reference	When a function is displayed on the indicator, the setting value that has been recorded in the weight measuring sensor is loaded first. If a setting has been changed then this change is reflected to the weight measuring sensor.

6-5 Details of functions

Depending on the environment where used, the response speed, stability decision, and so on can be set by using functions. To find out how to operate the functions, refer to Section 6-4 "Basic function operations." The "d" in each table indicates the readability. To find more details, refer to Appendix 1 "Specifications" and Section 6-5-7 "Setting the readability."

6-5-1 Auto zero

This function reduces flickering caused by a fluctuating zero point in order to maintain the zero display. If the zero point fluctuation is within Auto Zero operation range, it is brought within the zero point so as to maintain the zero display. The zero point after the zero point adjustment serves as a reference point.

[Auto zero]

Setting value		Operation range	Bringing into zero point
1. A.0	0	Off	Off
	1	±0.5d	Weak
	2	±1d	↑
	☆3	±2d	|
	4	±4d	↓
	5	±8d	Strong

* The ☆ symbol and "d" in the table respectively indicate the initial value and readability.

6-5-2 Setting the stability decision

This function sets a reference value to judge if the weighing status is stable. In the stability decision, the weighing status is considered to be stable when the weighed value is sequentially updated within the set range. When weighing is stable, the "◎" appears lit up on the display.

[Stability decision range]

Setting value		Decision range	Decision criteria
2A.S.H.	1	±0.5d	Stricter
	2	±1d	↑
	☆3	±2d	|
	4	±3d	|
	5	±4d	|
	6	±8d	|
	7	±12d	↓
	8	±18d	Milder

* The ☆ symbol and "d" in the table respectively indicate the initial value and readability.

Stability is judged by the fluctuation range of the weighed value. Though setting a larger stability decision range increases the potential error, it shortens the time required until the device reaches a point where considered stable.

[Number of times stability decision is performed]

Setting value		No. of times stability decision is performed	Decision criteria
2b.S.C.	1	16 times	Stricter
	2	10 times	↑
	3	8 times	|
	☆4	4 times	|
	5	Twice	↓
	6	Once	Milder

* The ☆ symbol in the table indicates the initial value.

Stability is judged by whether or not a specified number of weighed data are sequentially updated within the specified stability decision range.

Reference

- The time required for stabilization becomes shorter when environmental effects (vibration, wind, and so on) are smaller, but the time becomes longer when effects are larger.
- When the environmental conditions are the same, the time required for stabilization becomes shorter when the stability decision range is large and the readability is rougher.

6-5-3 Instability process when the value changes by 1 digit

When the stability decision criterion is set to a broad range, the weighed value might fluctuate while still in a stable status ("◎" is lit). If the displayed value changes at that time, then "◎" automatically turns off (now in unstable state).

[Instability process when the value changes by 1 digit]

Setting value		Operation	
2C.S.1	☆0	Off	Remains in stable status even when the displayed value changes by 1d ("◎" is lit).
	1	On	Changes to unstable when the displayed value changes by 1d ("◎" is turned off).

* The ☆ symbol and "d" in the table respectively indicate the initial value and readability.

6-5-4 Setting the number of times the moving average is calculated

[Number of times moving average is calculated]

Setting value		No. of times moving average is calculated	Response speed
3A.rE.	0	Auto switch	Auto switch
	1	Once	Faster
	☆2	10 times	↑
	3	20 times	|
	4	30 times	|
	5	60 times	|
	6	90 times	↓
	7	150 times	Slower

* The ☆ symbol in the table indicates the initial value.
  The response becomes faster when the number of times moving average is calculated is smaller. The response is slower when number of times is larger but the variation in the weighed value becomes smaller, which allows smooth data acquisition.
  When auto switch is set, the number of times that the moving average is calculated becomes smaller when the variation in the weighed value is larger but becomes larger when the device stabilizes.

6-5-5 Setting the weight update rate

The indicator and the weight measuring sensor have different weight update rates as shown in the following table:

Setting value		Indicator Weight update rate	Weight measuring sensor Weight update rate	Response speed
3b.ti	1	50 times/s	106 times/s	Faster
	2	50 times/s	53 times/s	↑
	☆3	25 times/s	26.5 times/s	↓
	4	12.5 times/s	13.25 times/s	Slower

* The ☆ symbol in the table indicates the initial value.
* When it is set to 3b.ti. = 1, the weight update rate of the weight measuring sensor is 106 times/s. However, that of the indicator is 50 times/s. (These are theoretical values that do not always match the actual values.)

6-5-6 Setting the signal processing

Setting value		Response speed
3C.Fr.	1	Faster
	2	↑
	☆3	↓
	4	Slower

* The ☆ symbol in the table indicates the initial value.
  The signal processing reduces unnecessary frequency components among the various frequency components that are included during weighing.

6-5-7 Setting the readability

The readability can be changed in five steps. When the readability is set to a rougher value, the effects from the external environment and the flickering of the weight display become smaller. This makes it easier to stabilize the weighing status.

[Switching the readability]

Setting value		Readability		Stability
		UF-620	UF-3200	
62.d.A.	☆1	0.001g	0.01g	More difficult to stable
	2	0.002g	0.02g	↑
	3	0.005g	0.05g	|
	4	0.01g	0.1g	↓
	5	0.02g	0.2g	Easier to stable

* The ☆ symbol in the table indicates the initial value.

6-5-8 Stability wait process during zero point adjustment or tare

This function enables or disables the stability wait process ("M blinking" display) when the zero point adjustment or tare are performed. Use this when the device will not quickly stabilize due to effects of wind or vibration or use to immediately reset the display to zero.

[Stability wait process]

Setting value		Stability wait process	
7. tA.	1	Disable	Performs the zero point adjustment or tare immediately.
	☆2	Enable	Performs the stability wait ("M blinking" display) process and then, performs the zero point adjustment or tare immediately after weighing has stabilized.

* The ☆ symbol in the table indicates the initial value.

6-5-9 Tare weight recording

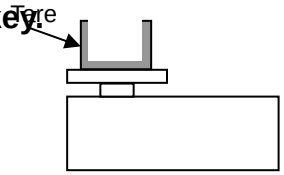
This function subtracts the recorded weight of the tare and samples at power-on. This is used to weigh the weight of the content, which has already been packed.

[Tare value recording]

Setting value		Tare value recording
8.tA.M	☆0	Disable
	1	Enable

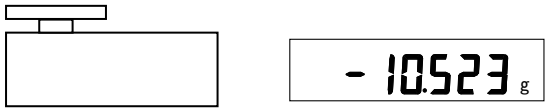
* The ☆ symbol in the table indicates the initial value.

1 **Mount the tare only during weighing and press the Zero/Tare key.**

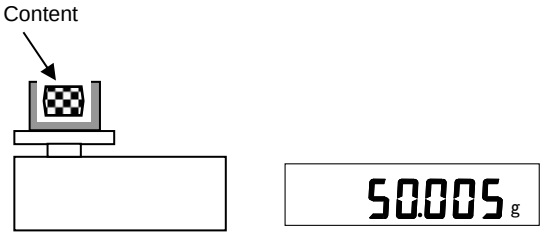


Operation

Each time the power is turned on, a weight value with the recorded tare weight subtracted is displayed.



If a packed item is mounted on the balance when the power is turned on, then only the weighed value of the content is displayed with the weight of the tare subtracted.



Weight of the content

Reference	Each time tare is performed, the recorded tare weight is updated. When a long period of time has passed with a tare or sample mounted, the error might become large. Periodically perform the tare while using an actual tare.

6-5-10 Operation settings for span adjustment

This function enables or disables the span adjustment. When it is set to disable, the span adjustment is not performed even when the Cal key is pressed or a C3 command is issued.

[Span adjustment operation setting]

Setting value		Operation
5. CA.	0	Disable
	☆3	Enable

6-5-11 Weighing unit

On this product only gram units are used.

[Weighing unit]

Setting value		Operation detail
61. u.A.	☆2	"g" (gram unit)

6-5-12 Turning the backlight on & off

This sets whether the backlight on the indicator on or off.

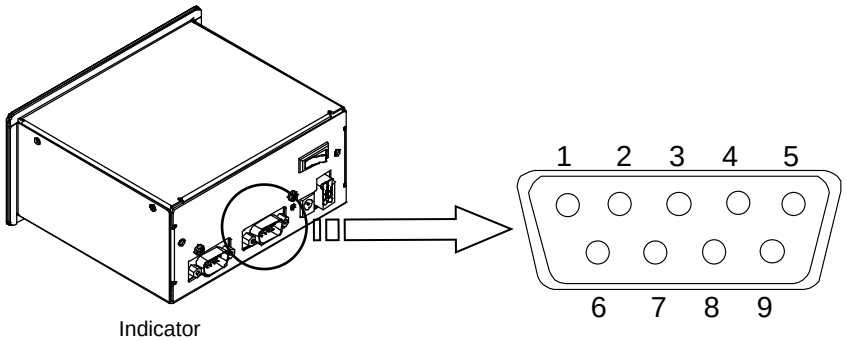
[Backlight]

Setting value		Operation detail
9. b.L	0	Off
	☆1	On

7 Connecting the indicator to external devices

Input and output to external devices such as a computer is possible via the RS-232C connector on the indicator.

7-1 Connector terminal No. and their corresponding functions



D-Sub9 pin

Terminal No.	Signal name	Input/output	Function/remarks
1	-	-	-
2	RXD	Input	RS-232C receive
3	TXD	Output	RS-232C transmit
4	DTR	Output	HIGH (at power-on)
5	SG	-	Signal ground
6	-	-	-
7	-	-	-
8	-	-	-
9	EXT.TARE	Input	External tare

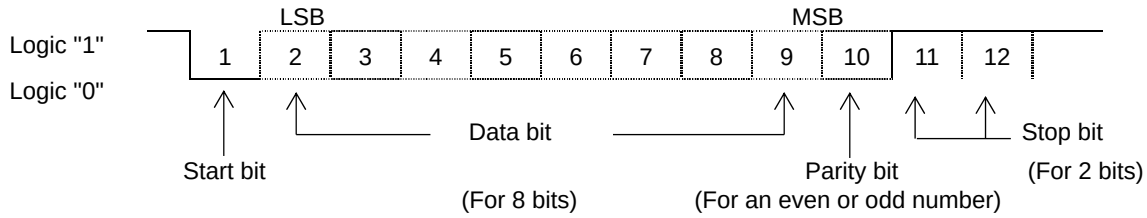
Reference	Connecting the external tare (No. 9) and the signal ground (No. 5) via a switch or a transistor switch allows making the tare and zero adjustment from external devices. When doing so, the connection (ON) period should be 400 ms or more (maximum voltage at off: 15 V, sink current at on: 20 mA).

7-2 Interface specifications

1 Transmission method — Serial transmission, asynchronous type
2 Transmission speed — 1200, 2400, 4800, 9600, 19200, 31250, and 38400 bps
3 Transmission code — ASCII code (8- or 7-bit)
4 Signal level — Conforms to EIA RS-232C
HIGH level (data logic: 0) +5 to +15V
LOW level (data logic: 1) -5 to -15V
5 One-character bit configuration in each format

Format	6 digit numeric	7 digit numeric	7 digit expanded numeric	Special
Start bit	1 bit, fixed			
Parity bit	None	None/odd number/even number, selectable		
Data bit	8 bits, fixed		7 bits/8bits, selectable	
Stop bit	2 bits, fixed		1 bit/2 bits, selectable	

The specifications can be set from the function "**4. I.F. ***."



Weight update rate and baud rate of the indicator

The baud rate should be set to the required speed or higher based on the weight update rate with reference to the following table.

Combinations of the necessary baud rate speed and output rates

Weight update rate of indicator	6 digit numeric format 7 digit numeric format 7 digit expanded numeric format Special format 1	Special format 2
50 times/s	9600bps *	19200bps *
25 times/s	4800bps	9600bps
12.5 times/s	2400bps	4800bps

(The weight update rate is a theoretical value.)
* When it is set to 3b.ti. = 1, the weight update rate of the weight measuring sensor is 106 times/s. However, the output rate from the indicator is 50 times/s.

7-3 Output data formats

7-3-1 Format details

Output data formats are used for weight data or other data to be output to external devices. The following four formats can be selected by setting functions

1. 6 digit numeric format

This format consists of 14 characters including the terminators (CR and LF).

1	2	3	4	5	6	7	8	9	10	11	12	13	14
P1	D1	D2	D3	D4	D5	D6	D7	U1	U2	S1	S2	CR	LF
Polarity	Numeric data (including a decimal point)							Unit		Status		Terminator	

2. 7 digit numeric format

This format consists of 15 characters including the terminators (CR and LF) and a parity bit can be added.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
P1	D1	D2	D3	D4	D5	D6	D7	D8	U1	U2	S1	S2	CR	LF
Polarity	Numeric data (including a decimal point)								Unit		Status		Terminator	

3. 7 digit expanded numeric format

This format consists of 15 characters including the terminators and a parity bit can be added.

This is a partly expanded format of the 7 digit numeric format. The differences from the 7 digit numeric format are:

- Data length (7 bits) can be specified.
- Stop bit (1 bit) can be specified.

Everything else is the same as the 7 digit numeric format.

4. Special formats

There are two types of special formats.

In these formats, the data length and stop bit can be specified in the same way as for the 7 digit expanded numeric format.

See “6-6-4 Output of special formats” for details.

Polarity (P1: 1 character)

P1	Code	Description
+	2BH	When data is zero or positive
−	2DH	When data is negative

Numeric data

6 digit numeric format: (D1–D7: 7 characters)
7 digit numeric format: (D1–D8: 8 characters)

D1–D7 (D8)	Code	Description
0–9	30H–39H	Numerics 0 to 9
•	2EH	Decimal point

- Numerics are right justified. Digits that do not contain numerics or codes are filled with '0'(30H) and then output.
- The location of a decimal point varies depending on the setting of the readability switch. (See “6-5-7 Setting the readability.”)

Unit (U1 and U2: 2 characters)

U1	U2	Code		Indicated unit
(SP)	G	20H	47H	“g”

Status 1 (S1: 1 character)

S1	Code	Description
(SP)	20H	Space (fixed)

Status 2 (S2: 1 character)

S2	Code	Description
S	53H	Data: Stable
U	55H	Data: Unstable
E	45H	Data error (“**o-Err**” is displayed*)

* When the capacity is exceeded by +1%

7-3-2 Output of special formats

Output format of the function "**4. I.F 41**"

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
P1	SP	D1	D2	D3	D4	D5	D6	D7	D8	SP	U1	U2	U3	CR	LF
Polarity	Blank	Numeric data (including a decimal point)								Blank	Unit			Terminator	

- P1 (1 character): Polarity, plus or zero: "+" (2BH), minus: "–" (2DH)
- SP (1 character): Blank: "△" (20H)
- D1–D8 (8 characters): Weight data, numerics: "0 to 9": (30H–39H), decimal point: "." (2EH)

* Numerics are right justified. Digits that do not contain numerics are filled with '0'(30H) and then output.

- SP (1 character): Blank: "△" (20H)
- U1–U3 (3 characters): Unit: gram "g△△" (67H)(20H)(20H)

* For output when unstable, the units (3 characters) are blank (20H).

(Ex.)

"**120.000 g**" (stable): +△△120.000△g△△<CR><LF>
"**123.456 g**" (unstable): +△△123.456△△△△<CR><LF>
"**o-Err**"*: △△△△△△H△△△△△△△<CR><LF>

* When the capacity is exceeded by +1%

Output format of the function "**4. I.F 42**"

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
S1	S2	S3	SP	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	SP	U1	CR	LF
Stability information			Blank	Numeric data (including polarity and a decimal point)										Blank	Unit	Terminator	

- S1–S3 (3 characters): Stability information, stable: "S△S" (53H)(20H)(53H)
unstable: "S△D" (53H)(20H)(44H)
- SP (1 character): Blank: " " (20H)
- D1–D10 (10 characters): Polarity, plus or zero: "△" blank (20H), minus: "–" (2DH)
Numerics: "0 to 9" (30H–39H), decimal point: "." (2EH)

* Numerics are right justified. Digits that do not contain numerics or codes are filled with '0'(30H) and then output.

- SP (1 character): Blank: "△" (20H)
- U1 (1 character): Unit: gram "g" (67H)

(Ex.)

"**120.000 g**" (stable): S△S△△△△120.000△g<CR><LF>
"**123.456 g**" (unstable): S△D△△△△123.456△g<CR><LF>
"**o-Err**"*: S△+<CR><LF>

* When the capacity is exceeded by +1%

**H: ASCII code
△: Blank

7-4 Input commands

Input commands are used for controlling the device from external devices.
Input commands are categorized into the following three types.
1 Zero adjustment/tare command
2 Output control setting
3 Span adjustment command

7-4-1 Basic operation

- This device uses full-duplex communication and so can process input commands while transmitting weight data.
- After the device normally executes received input commands, it sends a normal termination response or the data requested by the input command.
- When the device cannot normally complete commands or receives invalid input commands (error), the weight measuring sensor sends an error response.

The weight measuring sensor sends responses within one second, except in the following cases.

1 When it receives the zero adjustment/tare command
When the function setting of tare “7. tA.” is set to “the weight measuring sensor becomes zero after stabilizing (stability wait).”
2 When it receives input commands while operating (while setting functions or during span adjustment, etc.)
3 When it takes time to process received input commands
In these cases, it sends responses after it finishes processing and executing the commands.

Note	• When an input command is transmitted from an external device, the next input command should not be transmitted until a response from the weight measuring sensor is received.

7-4-2 Command formats

1 Zero adjustment/tare command

Command body		Code		Description	Response
C1	C2				
T	(SP)	54H	20H	• Zero adjustment • Tare	A00: Normal termination E01: Command error E04: Unable to execute zero adjustment/tare (out of scope, weight error, etc.) E09: Time-out error

2 Output control setting

Command body		Code		Description	Response
C1	C2				
O*1	0*2	4FH	30H	Output stop	A00: Normal termination E01: Command error
O*1	1	4FH	31H	Continuous output	

- After executing a command, the device retains the status until the next command is input.
  However, when the power source is turned off, the setting returns to function setting values.

*1: Uppercase alphabetic character “O,” *2: Numeric “zero”

3 Span adjustment command

Command body		Code		Description	Response
C1	C2				
C	0	43H	30H	Cal key invalid Span adjustment is prohibited.	A00: Normal termination E01: Command error E02: Operation prohibited E03: Interruption by operation E04: Abnormal termination
C	3	43H	33H	Begin span adjustment.	

- It takes some time to respond since the device responds after it finishes processing.
- Once a C0 command has been sent, the device does not execute the C3 command even if a C3 command is subsequently sent. To cancel it, the function should be displayed on the indicator or the power should be turned off.
- The device does not execute a C3 command when the function on the indicator is set to “**5. CA. 0**” (Cal key invalid).
- The sensor does not send responses A01 or A02 for span adjustment commands from the indicator.

7-4-3 Examples of input commands

T△(CR)(LF): Execute zero adjustment/tare (△: Space (20H))
C3(CR)(LF): Begin span adjustment.
O1(CR)(LF): Begin output.

7-4-4 Response format

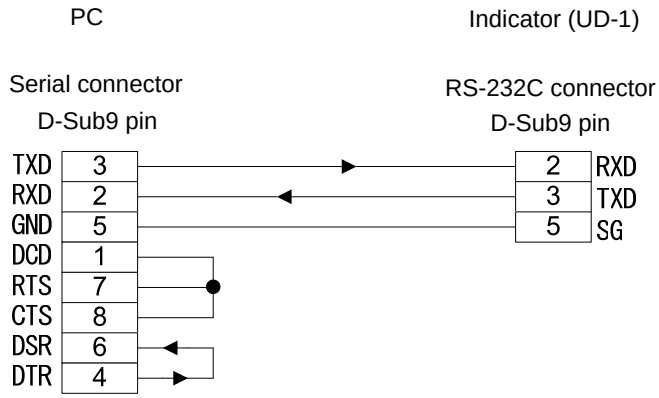
"A00 and Exx format" responses
This format consists of 5 characters including terminators (CR and LF).

1	2	3	4	5
A1	A2	A3	CR	LF
Response content			Terminator	

See "Command formats" 1 to 3 for response content.

7-5 Example of connection to external device (PC)

■■■ Example of connection to a PC ■■■



8 Using the weight measuring sensor without an indicator

Weight measuring sensors can directly transmit data and receive data from external devices without connecting to an indicator. When an indicator is not connected, data can be transmitted up to 106 times/s (theoretical value). Transmit commands written in the command formats operate the weight measuring sensor.

To directly connect the weight measuring sensor to external devices, the communication cable should be branched between the RS-232C and power supply; and an external power source should be supplied from the 24 VDC power source pin of the D-Sub 9 pin. (See “8-5 Example of connection to external device.”)

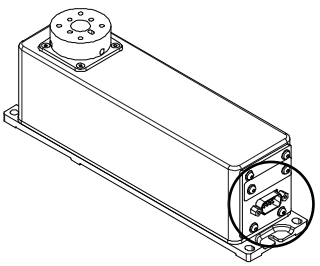
Note	Wait at least 10 seconds after turning the power on before transmitting the first command. The initial value is set to output stop, so at the first usage, an O1 command should be transmitted or an indicator should be connected and set to “41U. o.c 1.” (See “Command formats 8-4-2”) To change communication specifications and functions other than the corresponding commands of the weight measuring sensor, an indicator should be connected and the functions “4U.I.F 3” to “45U.St *” should be set.

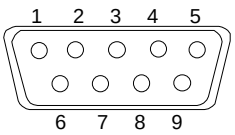
8-1 Connector terminal No. and their corresponding functions

Connector terminal No. and their corresponding functions

Terminal No.	Signal name	Input/output	Functions/remarks
1	DC24V	Input	Power source +24 V
2	RXD	Input	RS-232C receive
3	TXD	Output	RS-232C transmit
4	GND	-	Power source grand
5	SG	-	Signal ground
6	EXT.TARE	Input	External tare
7	FG	-	Frame grand
8	A	Input/output	RS-485 A
9	B	Input/output	RS-485 B

* Use a twisted pair cable.

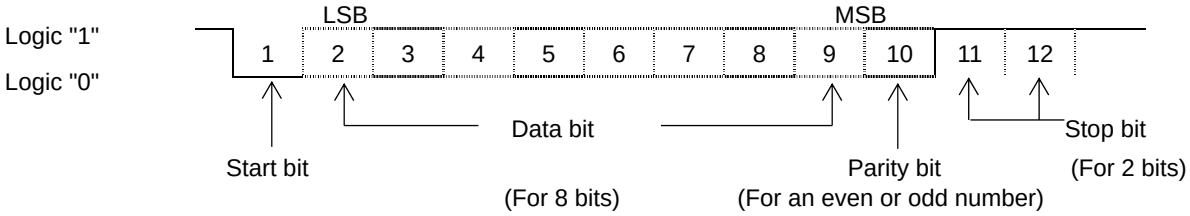




Reference	Connecting the external tare (No. 6) and the signal ground (No. 5) by a contact point or a transistor switch makes it possible to execute tare and zero adjustment from external devices. When doing so, the connection (ON) period should be 400 ms or more (maximum voltage at off: 15 V, sink current at on: 20 mA).

8-2 Interface specifications

1 Transmission method: Serial transmission asynchronous communications systems
2 Transmission speed: 1200, 2400, 4800, 9600, 19200, 31250, and 38400 bps
3 Transmission code: ASCII code (8- or 7-bit)
4 Signal level: Conforms to EIA RS-232C
HIGH level (data logic: 0) +5 to +15 V
LOW level (data logic: 1) −5 to −15 V
5 Output format: 7 digit expanded numeric format (fixed)
6 Bit configuration per character
Start bit: 1 bit
Parity bit: None/odd number/even number, selectable
Data bit: 7 bits/8bits, selectable
Stop bit: 1 bit/2 bits, selectable



Weight update rate and the baud rate

The baud rate should be set to the required speed or higher based on the weight update rate while referring to the following table.

Combinations of required baud rate speed and output rates

The weight update rate*	Necessary speed
106 times/s	19200 bps
53 times/s	9600 bps
26.5 times/s	4800 bps
13.25 times/s	2400 bps

* The weight update rate is a theoretical value.

8-3 Output data format

This is a data format used to output the weight from the weight measuring sensor to external devices.

Note	The output format from the weight measuring sensor is fixed to a 7 digit expanded numeric format. The 6 digit numeric, 7 digit numeric, and special formats cannot be used.

8-3-1 Data format (7 digit expanded numeric format)

This format consists of 15 characters including the terminators and a parity bit can be added.

The data length and the stop bit can be specified.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
P1	D1	D2	D3	D4	D5	D6	D7	D8	U1	U2	S1	S2	CR	LF
Polarity	Numeric data (including a decimal point)								Unit		Status		Terminator	

Polarity (P1: 1 character)

P1	Code	Description
+	2BH	When data is zero or positive
−	2DH	When data is negative

Numeric data (D1–D8: 8 characters)

D1–D8	Code	Description
0–9	30H–39H	Numerics 0 to 9
•	2EH	Decimal point

* Numerics are right justified. Digits that do not contain numerics are filled with ‘0’ (30H) and then output.

Unit (U1 and U2: 2 characters)

U1	U2	Code		Indicated unit
(SP)	G	20H	47H	“g”

Space (S1: 1 character)

S1	Code	Description
(SP)	20H	Space (fixed)

Status (S2: 1 character)

S2	Code	Description
S	53H	Stable data
U	55H	Unstable data
E	45H	Error data (when the capacity is exceeded by +1%)

8-4 Input commands

Input commands used for controlling the weight measuring sensor from external devices are categorized into the following four types.

1 Zero adjustment/tare command
2 Output control command
3 Span adjustment setting
4 Function setting

8-4-1 Basic operation

Basic operation

- This device uses full-duplex communication, so it can process input commands while transmitting weight data.
- After the device normally executes received input commands, it sends a normal termination response or the data requested by the input command.
- When the device cannot normally complete commands or receives invalid input commands (error), the weight measuring sensor sends an error response.

Response timing from the weight measuring sensor
The weight measuring sensor sends responses within one second, except in the following cases.

1 When it receives a zero adjustment/tare command
When the function setting for tare “7. tA.” is set to “weight measuring sensor becomes zero after stabilizing (stability wait).”
2 When it receives input commands while operating (while setting functions or during span adjustment, etc.)
3 When it takes time to process received input commands
In these cases, it sends responses after it finishes processing and executing the commands.

Note	• Wait at least 10 seconds after turning the power on before transmitting the first command. • When an input command is transmitted from an external device, the next input command should not be transmitted until the response from the weight measuring sensor is received.

8-4-2 Command formats

(CR) and (LF) should be added after each command body.

1 Zero adjustment/tare command

Command body		Code		Description	Response
C1	C2				
T	(SP)	54H	20H	• Zero adjustment • Tare	A00: Normal termination E01: Command error E04: Unable to execute zero adjustment/tare (out of scope, weight error, etc.)

2 Output control setting

Command body		Code		Description	Response
C1	C2				
O *1	0 *2	4FH	30H	Output stop	A00: Normal termination E01: Command error
O *1	1	4FH	31H	Continuous output	

*1: Uppercase alphabetic character “O,” *2: Numeric “zero”

3 Span adjustment command

Command body		Code		Description	Response
C1	C2				
C	0	43H	30H	Cal key invalid	A01: Zero point adjustment has begun A02: Waiting for a weight to be put on the scale A00: Normal termination E01: Command error E02: Error due to a prohibited setting E03: Interrupted by operation E04: Abnormal termination (when 1-Err and 2-Err occur)
C	3	43H	33H	Begin span adjustment *	

[Span adjustment procedures]
Descriptions inside the parentheses are equivalent to those when using an indicator.

1. When the weight measuring sensor receives a C3 command, it sends response A01 and begins zero point adjustment. (“on 0” flashes)
2. After a while, when it completes the zero point adjustment, it sends response A02. (“on F.S” is displayed)
   After the response A02, a weight for span adjustment should be put on the scale. (“on F.S” flashes)
3. After it completes the span adjustment, it sends response A00 and returns to the weighing mode. (the weight is displayed)

* Once a C0 command is sent, the device will not execute the C3 command even if a C3 command is subsequently sent. To cancel it, the function should be displayed on the indicator or the power should be turned off.

* The device will not execute a C3 command when the function on the indicator is set to “5. CA. 0” (Cal key invalid).

4 Function setting

The following are commands equivalent to the functions on the indicator. To use functions not specified in the following table, connect an indicator and set the function.

Command body				Code				Description	Equivalent functions on the indicator
Body		Breakpoint	Numerics						
C1	C2	C3	C4	C1	C2	C3	C4		
F	0	,	0–5	46H	30H	2CH	30H – 39H	Auto zero	1. A.0 0–5
F	1	,	1–8	46H	31H	2CH		Range for determining stability	2A. S.H. 1–8
F	2	,	1–6	46H	32H	2CH		Number of times stability is determined	2b. S.C. 1–6
F	3	,	0–7	46H	33H	2CH		Number of times moving average is calculated	3A. rE. 0–7
F	4	,	1–4	46H	34H	2CH		Processing signal	3C. Fr. 1–4
F	5	,	1–4	46H	35H	2CH		Weight update rate	3b. ti. 1–4
F	6	,	1–5	46H	36H	2CH		Specifying the readability	62. d.A. 1–5

Response descriptions
A00: Normal termination E01: Command error E02: The numerics are out of scope or none

* Command bodies and numerics are divided by "," (2CH).

8-4-3 Examples of input commands

T△(CR)(LF)	Executing zero adjustment/tare (△: Space (20H))
C3(CR)(LF)	Begin span adjustment
O1(CR)(LF)	Begin continuous output
F0,2(CR)(LF)	Setting the operable range of auto zero to ±1d
F1,6(CR)(LF)	Setting the range for determining stability to 8d
F6,4(CR)(LF)	Setting the readability to 0.01 g

8-4-4 Response format

"A00 and Exx format" responses

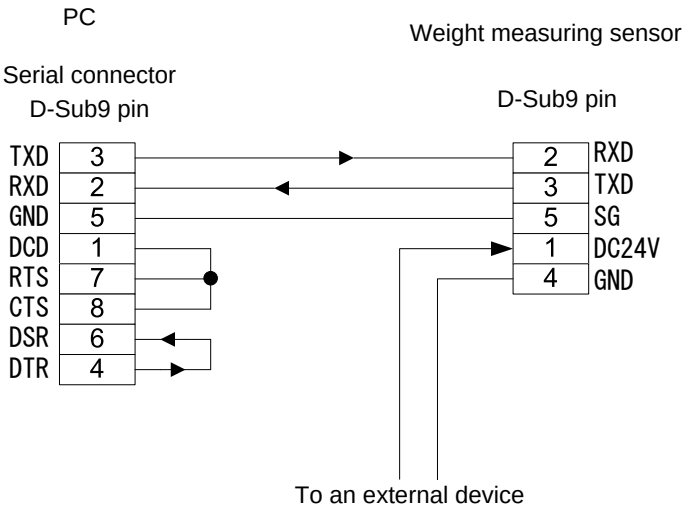
This format consists of 5 characters including the terminators (CR and LF).

1	2	3	4	5
A1	A2	A3	CR	LF
Response content			Terminator	

See "Command formats" 1,2 and 3 for response content.

8-5 Example of connection to external device (PC)

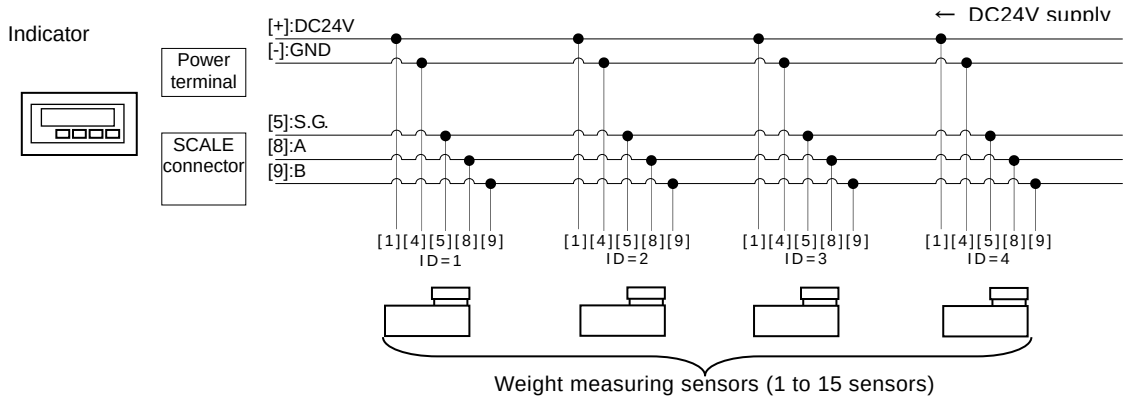
■■■ Example of connection to a PC ■■■



9 Using via the multi-drop connection

9-1 Overview of the multi-drop connection

Up to 15 weight measuring sensors can be used per indicator via the RS-485 multi-drop connection. By assigning an ID number to each weight measuring sensor in advance and specifying that ID number in the indicator, the indicator can communicate with the specified weight measuring sensor.



RS-485 multi-drop connection

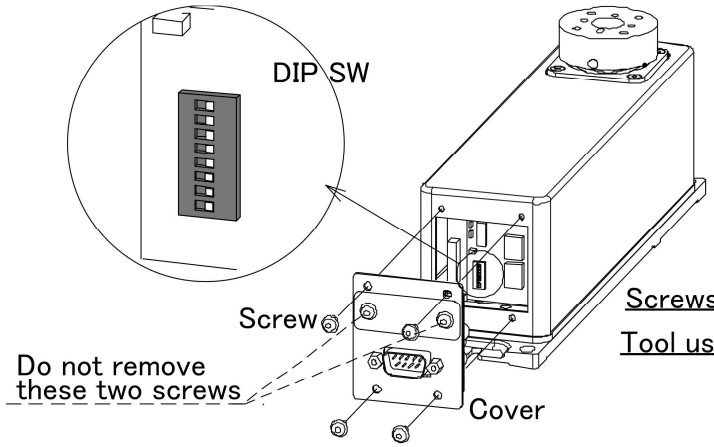
(Please consult with us for how to connect multiple weight measuring sensors from the PLC.)

9-2 Assigning ID numbers to the weight measuring sensors

To set an ID number, operate the dip switches built in the weight measuring sensor.

1 Remove the cover from the weight measuring sensor.

Use an Allen wrench to remove the four screws shown in the following figure and remove the cover. Do not remove any screws other than those specified in the figure. Since the cover is connected to the main unit via board wiring through a cable, these cannot be completely separated. Be careful not to cut the cable by pulling the cover too far away.



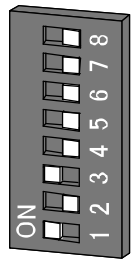
Screws: M3 hexagon button bolts

Tool used: Allen wrench with 2mm bottom

2 Operate the dip switches to assign an ID number.

When the cover is removed, dip switches can be seen that are used to set an ID number at rear of the main unit.
Refer to the following table to set an ID number by using a thin rod.
Be careful not to damage the board and cable during setting.

Example of setting



(When ID=5)

Switches No. 1 to 4 are used to set an ID number.

When setting with the dip switches is complete, reinstall the removed cover back to the original position.

ID	Dip switch				
	1	2	3	4	
0	-	-	-	-	(Initial value)
1	ON	-	-	-	
2	-	ON	-	-	
3	ON	ON	-	-	
4	-	-	ON	-	
5	ON	-	ON	-	
6	-	ON	ON	-	
7	ON	ON	ON	-	
8	-	-	-	ON	
9	ON	-	-	ON	
10	-	ON	-	ON	
11	ON	ON	-	ON	
12	-	-	ON	ON	
13	ON	-	ON	ON	
14	-	ON	ON	ON	
15	ON	ON	ON	ON	

* "-" indicates OFF.

Note	Assign different ID numbers (1 to 15) for the weight measuring sensors that are connected with one another via the multi-drop connection. The setting "ID=0" can be used for a one-to-one connection only and cannot be used for the multi-drop connection.

9-3 Communicating with the connected weight masuring sensor

Once an ID number for a weight measuring sensor has been set, connect it to the indicator and check operation.

1 Connect the indicator to the weight measuring sensor.

Make a connection equivalent to that shown in the wiring diagram in Section 9-1 "Overview of the multi-drop connection."
When all the weight measuring sensors and an indicator are connected, turn on the indicator.
The indicator displays the weighed value from the weight measuring sensor having the matching ID number.
(If the ID number in the indicator does not match that of any of the weight measuring sensors, then "E1-Err" blinks or is lit.)

2 Make the indicator display an ID number.

Press the Set(ID) key.

3 Specify an ID number.

Use the Zero/Tare(+) or Function(-) key to display an ID number to be specified.
Zero/Tare(+) key: Increases the number (01→02→...→15→01)
Function(-) key: Decreases the number (15→14→...→01→15)
When a desired ID number is displayed, press the Set(ID) key.

The weighed value of the weight measuring sensor with the specified ID number is displayed.

Switching between ID numbers

To communicate with a different weight measuring sensor, perform steps 2 and 2 above.

The value recorded in the weight measuring sensor is loaded as a function setting value to the indicator every time ID numbers are switched.
If a function setting value was changed from the indicator, then that value is reflected at the weight measuring sensor.

10 Troubleshooting

10-1 Error messages

When the indicator is connected, the following messages may appear depending on the situation.

Message	Cause	Action
o-Err	The weight of the sample is more than the capacity. (When the total weighed value is more than the capacity + 1% of capacity, "**o-Err**" is displayed.)	• Unload the sample and weigh it in sections. • Replace the tare with a lighter one.
1-Err	The mass of the weight used for the span adjustment is much lighter than the capacity of the weight measuring sensor.	• During span adjustment with an external weight, utilize a weight that is as close to the capacity as possible.
2-Err	The display error during the span adjustment has exceeded 1.0%.	• Check that the correct weight was put in place and that no objects other than the weight are on the pan. Then, execute the span adjustment again.
b-Err d-Err	The balance is influenced by static electricity or noise.	• Turn the power on again. • If this error occurs again, electrical components may have failed. Please contact the reseller from which the balance was purchased.
E 1-Err	• There are no inputs from the weight measuring sensor. • The weight measuring sensor(s) are not connected to the indicator.	• Check the connection between the indicator and the weight measuring sensors. • Turn the power on again. • When the indicator is connected to the weight measuring sensors by way of a RS-232C cable, use a straight cable.

10-2 Troubleshooting

Symptom	Cause	Action
Nothing appears on the display even when the balance is powered on.	The power supply is not connected.	• Check that the power supply is connected. • If nothing is displayed even when the power supply is properly connected, then the electrical components or the power supply cable of the balance may have failed. • Please contact the retailer from whom the balance was purchased.
The display flickers.	The weight measuring sensor may be affected by an external influence such as wind and vibration.	Change the stability decision and readability settings.
The displayed weight is incorrect.	This error is caused by the balance not being used for a long period of time or being relocated.	Perform span adjustment.
	The weight measuring sensors are not horizontal.	Check the levelness before installation.
	The tare range is set or is not set.	Unload the sample from the weighing pan and then zero the readout to continue measurement.
An error still exists after calibration.	The balance was affected by an external influence such as wind and vibration during the calibration.	There are possible effects from vibration or wind. Take wind and vibration-preventive measures or change the installation location of the balance and perform the calibration again.
The M flashes continuously flashes. (for example, when the [Zero/Tare] key is pressed)	The balance may be affected by an external influence such as wind and vibration.	There are possible effects from vibration or wind. Take appropriate measures or change the installation location of the balance.
To reset to the initial settings at purchase		It is possible to reset this product to the initial settings. Refer to Section 10-3 "How to reset to the initial state."

10-3 How to reset to the initial state

The function settings can be reset to the initial (default) values by using the following procedures.
To do this, the indicator is required.

1 **Call up the initialization mode.**

Press the Function key while pressing the Zero/Tare key until "**Func2**" is displayed.
The display changes to "**1.ini. 0**."

2 **Select "1. ini. 1."**

Press the Zero/Tare key to select "**1. ini. 1**."

3 **Press the Set key.**

The settings are now initialized and the balance returns to the weight display mode.

Appendices

Appendix 1 Specifications

Weight measuring sensor specifications

Model	UF-620	UF-3200
capacity	620g	3200g
Readability (d)	0.001g,0.002g,0.005g, 0.01g, and 0.02g	0.01g,0.02g,0.05g,0.1g, and 0.2g
Weight measurement method	Electromagnetic force balancing method	
Repeatability (σ)	0.001g	
Linearity	±0.002g	
Sensitive drift	±2 ppm/°C or less (10 to 30°C)	
Temperature and humidity ranges	Temperature: 10 to 30 °C Humidity: 80%rh or lower (without condensation)	
Power supply	DC 24 V ±10%, 0.1 A	
Material	Stainless steel	
Overload protection level	Approx. 2 kg *1 Approx. 0.1 N·m *1	Approx. 5.5 kg *1 Approx. 0.3 N·m *1
Mass	Approx. 2.2 kg	
Protection code (IP code)	IP65 *2	
Options	Weighing pan (SUS304) D-Sub9 pin plug (Water-proof type) Water-proof harness (5m,10m)	

*1 These are theoretical values and might not always match the actual values. Also, these values do not guarantee the balance performance when the release mechanism activates.

*2 Applicable only when the optional waterproof type D-Sub9 pin plug or a one-side waterproof type inter-unit connection cable is used.

Indicator specifications

Model	UD-1
Display device	Liquid-crystal display (with backlight)
Overloaded indication	When the capacity + 1% is exceeded, " **o-Err** " is displayed.
Material of the control panel	PET
Material of the housing	Metal
Temperature and humidity ranges	Temperature: 0 to 40°C Humidity: 80%rh or less (without condensation)
Power supply	DC 24V±10%, 0.1 A
Mass	Approx. 0.7 kg
Options	AC adapter (100 to 240V) Inter-unit connection cable (6 types) •One-side waterproof type *3 (3m, 4.5m, and 10m) •Non-waterproof type (3m, 4.5m, and 10m) BCD output

*3 The end that connects to the weight measuring sensor is waterproof.

Appendix 2 Indicator function list

Function list (1/4) * The ☆ symbol and "d" in the table respectively indicate the initial value and readability

Item	Displayed/setting value	Detail
Auto zero (zero tracking range)		
	1. A.0	0 Off
		1 ±0.5d
		2 ±1d
		☆3 ±2d
		4 ±4d
		5 ±8d
Stability decision range		
	2A.S.H.	1 ±0.5d
		2 ±1d
		☆3 ±2d
		4 ±3d
		5 ±4d
		6 ±8d
		7 ±12d
		8 ±18d
Number of times stability decision is performed		
	2b.S.C.	1 16 times
		2 10 times
		3 8 times
		☆4 4 times
		5 2 times
		6 1 time
Instability process when the value changes by 1 digit		
	2C.S.1	☆0 Disable
		1 Enable
Number of times moving average is calculated		
	3A. rE.	0 Auto switch
		1 Faster
		☆2 ↑
		3 |
		4 |
		5 |
		6 ↓
		7 Slower

Function list (2/4) * The ☆ symbol indicates the initial value.

Item	Displayed/setting value	Detail
Weight update rate (The number in () indicates the weight update rate of the weight measuring sensor)		
3b. ti.	1	50 times/s (106 times/s) *1
	2	50 times/s (53 times/s)
	☆3	25 times/s (26.5 times/s)
	4	12.5 times/s (13.25 times/s)
Signal processing		
3C. Fr.	1	Faster
	2	↑
	☆3	↓
	4	Slower
RS-232C settings for the indicator		
4. I.F.	0	Stops I/O
	1	6 digit numeric format
	☆2	7 digit numeric format
	3	7 digit expanded numeric format
	4	Special formats
Special format selection(displayed when "4. I.F. 4." is selected)		
4. I.F.4*	☆41	Special format 1
	42	Special format 2
Output control (Displayed when "4. I.F. 1 to 4." is selected)		
41.o.c.	0	Stops output
	☆1	Continuous output*2
Baud rate (Displayed when "4. I.F. 1 to 4." is selected)		
42.b.L.	1	1200 bps
	2	2400 bps
	3	4800 bps
	☆4	9600 bps
	5	19200 bps
	6	31250 bps
	7	38400 bps
Parity (Displayed when "4 I.F. 2 to 4." is selected)		
43.PA.	☆0	None
	1	Odd number
	2	Even number

*1
When is set to 3b.ti. = 1, the weight update rate of the weight measuring sensor is 106 times/s. However, that of the indicator is 50 times/s. (These rates are theoretical values and might not always match the actual values.)

*2
The continuous output intervals are synchronous with the weight update rate set in "3b. ti. *" (indicator).

Function list (3/4) * The ☆ symbol indicates the initial value.

Item	Displayed/setting value	Detail
Data length (Displayed when "4 I.F. 3 to 4." is selected)		
44.d.L.	7	7 bits
	☆8	8 bits
Stop bit (Displayed when "4 I.F. 3 to 4." is selected)		
45.St.	1	1 bit
	☆2	2 bits
RS-232C settings for the weight measuring sensor		
4U.I.F.	☆0	Does not change the weight measuring
	3	sensor output settings Changes the weight measuring sensor output settings
Output control (Displayed when "4U.I.F. 3" is selected)		
41U.o.c.	☆0	Stops output
	1	Continuous output*3
Baud rate (Displayed when "4U.IF. 3" is selected)		
42U.b.L.	1	1200 bps
	2	2400 bps
	3	4800 bps
	4	9600 bps
	☆5	19200 bps
	6	31250 bps
	7	38400 bps
Parity (Displayed when "4U.I.F. 3" is selected)		
43U.PA.	☆0	None
	1	Odd number
	2	Even number
Data length (Displayed when "4U.I.F. 3" is selected)		
44U.d.L.	7	7 bits
	☆8	8 bits
Stop bit (Displayed when "4U.I.F. 3" is selected)		
45U.St.	1	1 bit
	☆2	2 bits

*3 The continuous output intervals are synchronous with the weight update rate set in "3b. ti. *" (weight measuring sensor).

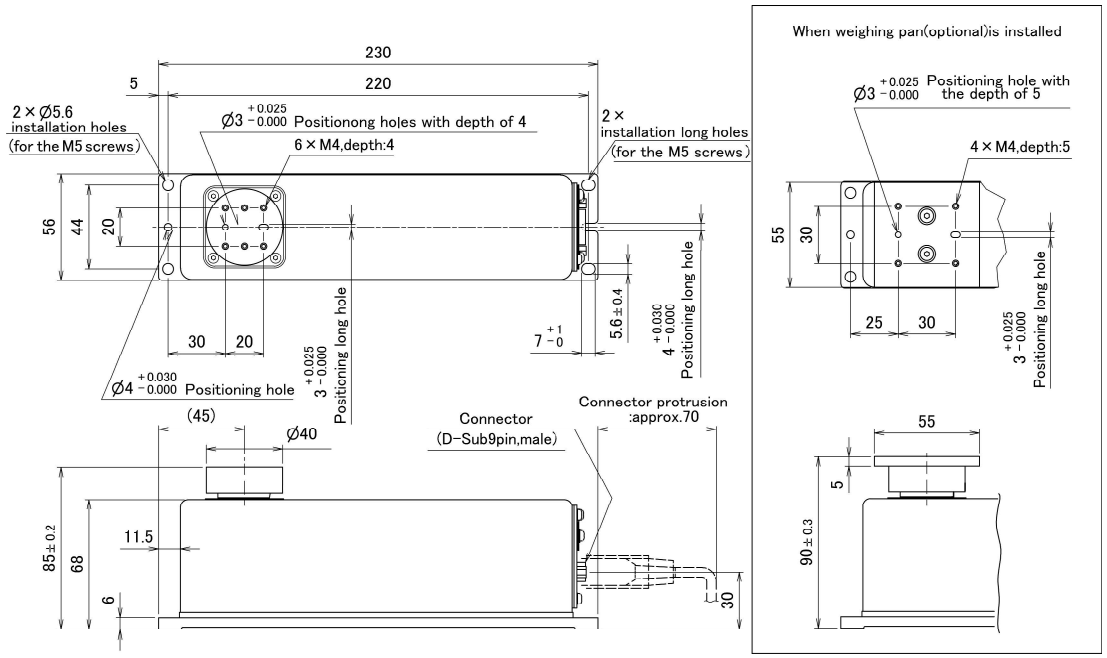
Function list (4/4) * The ☆ symbol indicates the initial value.

Item	Displayed/setting value	Detail		
Span adjustment				
	5. CA.	0	Disable	
		☆3	Enable (Press the Cal key to execute)	
Indicated unit setting				
	61.u.A.	☆2	"g" (gram unit)	
Readability setting			UF-620	UF-3200
	62.d.A.	☆1	0.001g	0.01g
		2	0.002g	0.02g
		3	0.005g	0.05g
		4	0.01g	0.1g
		5	0.02g	0.2g
Zero point adjustment / stability wait process during zero point adjustment or tare				
	7. tA.	1	Disable	
		☆2	Enable	
Tare value recording				
	8.tA.M.	☆0	Disable	
		1	Enable	
Backlight				
	9. b.L.	0	Off	
		☆1	On	

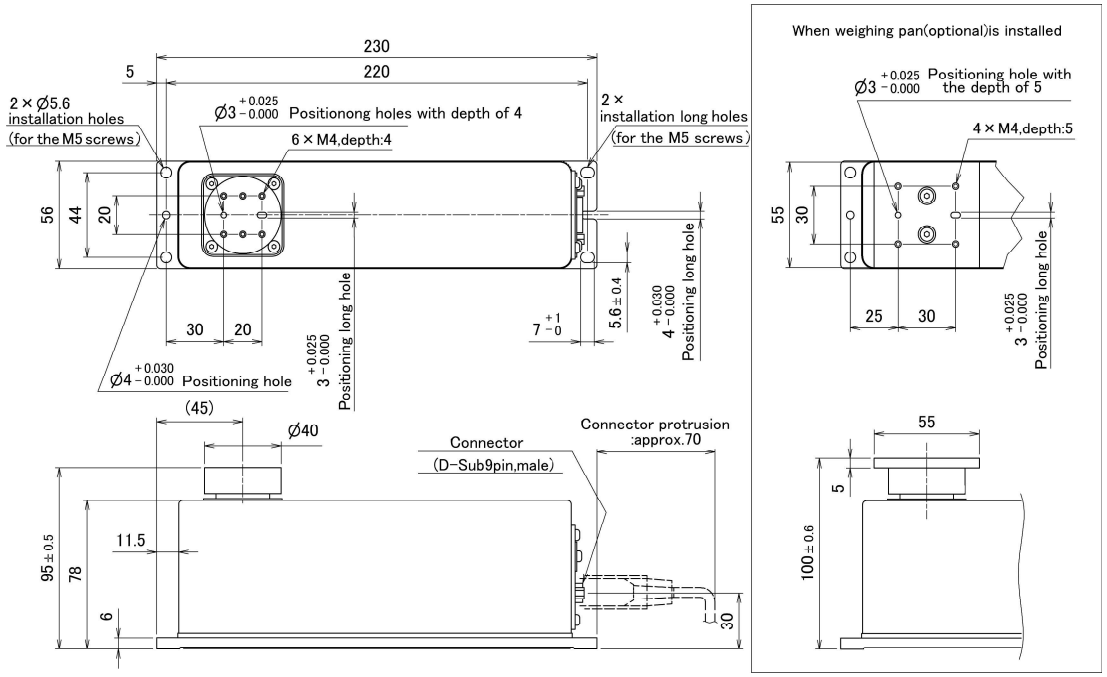
Appendix 3 Outlines

■ Weight measuring sensor

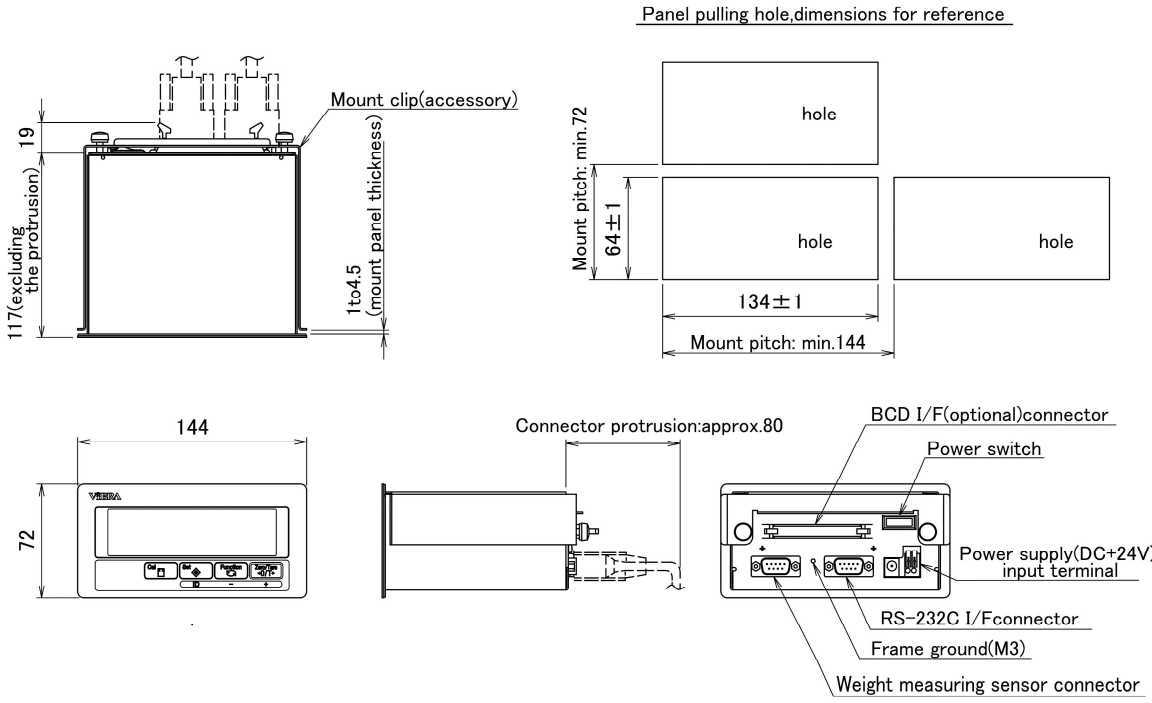
・UF-620



・UF-3200



■ Indicator


Panel pulling hole,dimensions for reference
Mount clip(accessory)
19
117(excluding the protrusion)
1to4.5 (mount panel thickness)
hole
hole
hole
Mount pitch: min.72
64±1
134±1
Mount pitch: min.144
144
72
Connector protrusion:approx.80
BCD I/F(optional)connector
Power switch
Power supply(DC+24V) input terminal
RS-232C I/Fconnector
Frame ground(M3)
Weight measuring sensor connector