AD-4212D-33
AD-4212D-32
AD-4212D-302
AD-4212D-301

Production Weighing Unit

INSTRUCTION MANUAL

A&D Company, Ltd.

1WMPD4003129D

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1. INTRODUCTION

This manual describes how the AD-4212D series weighing unit works and how to get the most out of it in terms of performance.

Read this manual thoroughly before using the AD-4212D and keep it at hand for future reference.

1.1. Features

- A compact Weighing Unit suitable for use in equipment for production line systems, draft chambers or glove boxes. The weighing unit is compact.
- The sensitivity adjustment using the internal weight can easily be performed.
- A Super Hybrid Sensor is used to provide high resolution.

Model	Weighing capacity	Readability	Stabilization time*1
AD-4212D-33	32g	0.001mg	7 seconds
AD-4212D-32	32g／5.1g*2	0.01mg／0.001mg*2	7 seconds
AD-4212D-302	320g	0.01mg	7 seconds
AD-4212D-301	320g	0.1mg	3 seconds

***1** With FAST selected under good environment

***2** Smart range (Refer to "5. SMART RANGE FUNCTION".)

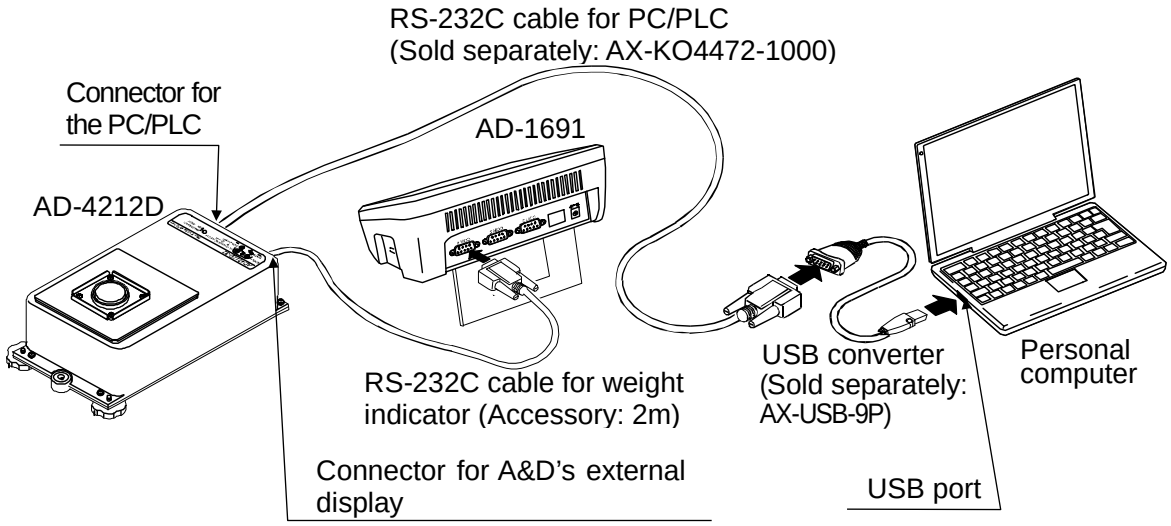
- The AD-4212D series can output the weighing digital data directly. Therefore, the AD-4212D series (the weighing unit) can be connected to a personal computer or a PLC directly.
- The AD-4212D series has a patented shock absorber under the weighing pan and can cope with movement in all directions, protecting the weighing unit from an actuator malfunction.
- BCD output, comparator output, and analog output can be performed by selecting the option to be installed on the AD-8922A.
- By connecting the AD-8923-BCD / CC (Expansion Controller for Weighing Line), weighing value data from the AD-4212D can be read, and re-zero and sensitivity adjustment operations can be performed manually.
  In addition, the AD-8923-BCD can use the BCD output, and the AD-8923-CC can use the CC-Link interface.

  * CC-Link is a high-speed field network that can handle control and information at the same time.
- By using the Windows software "WinCT-AD4212D," you can check the weighing display on a PC and change the internal settings of the AD-4212D.
- By connecting an AD-8551R Modbus RTU converter (sold separately), RS-232C output can be converted into RS-485 communication for Modbus RTU.
- By connecting an AD-8552EIP EtherNet/IP converter (sold separately), RS-232C output can be converted into EtherNet/IP communication.

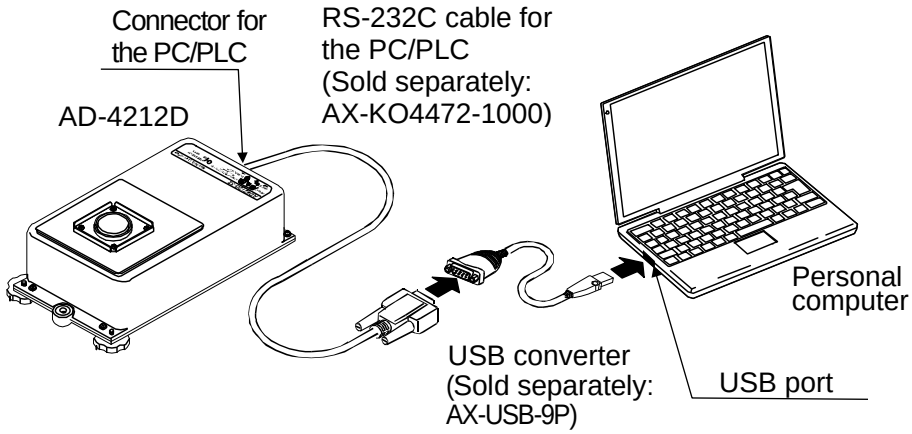
* The AD-1691 (Weighing Environment Analyzer) and models supplied with the AD-1691 are no longer available.

Example 1 (Connecting to an AD-1691, a personal computer or an AD-8922A)

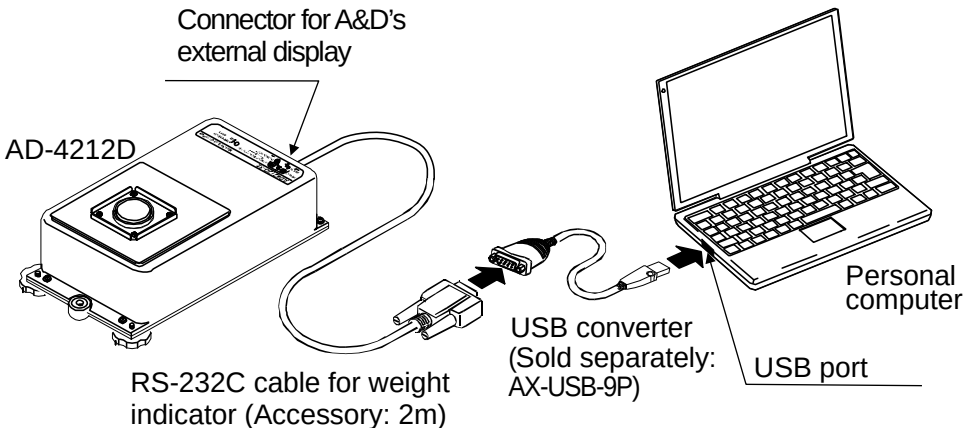
● When connecting to AD-1691 and PC



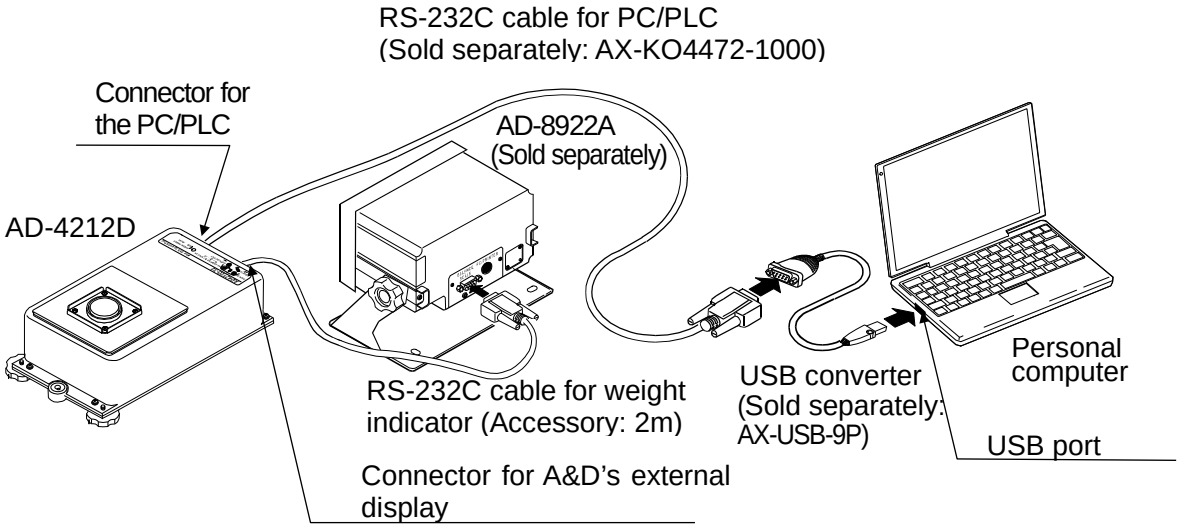
● When only connecting the AD-4212D to a PC (When using WinCT or other related software.)



● When only connecting the AD-4212D to a PC (When using WinCT-AD4212D.)

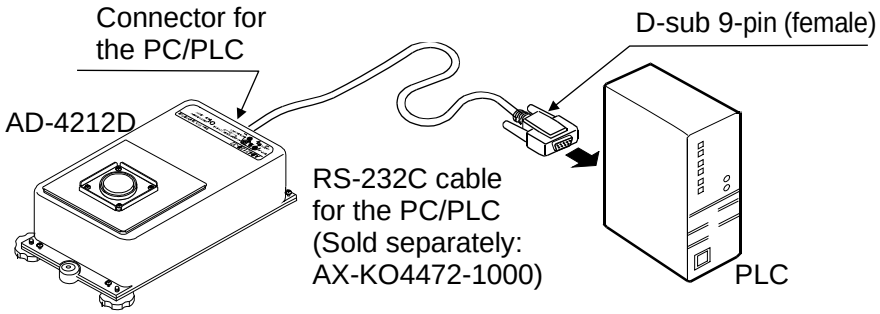


● When connecting the AD-4212D to the AD-8922A (External display) and PC



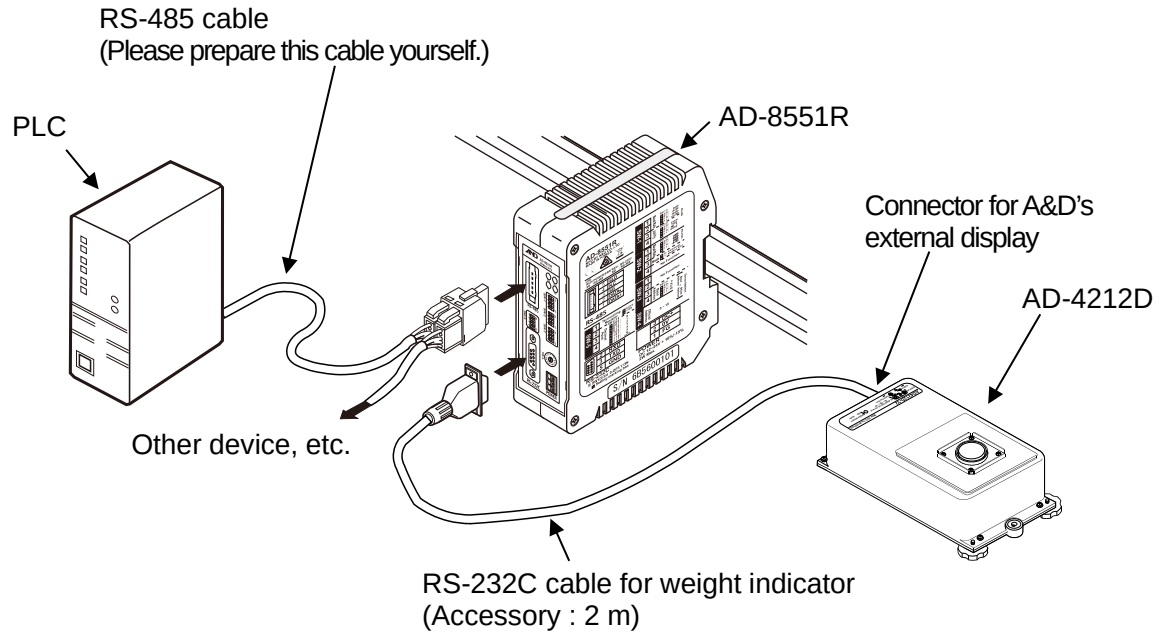
Example 2 (Connecting to a PLC)

● When connecting using the RS-232C

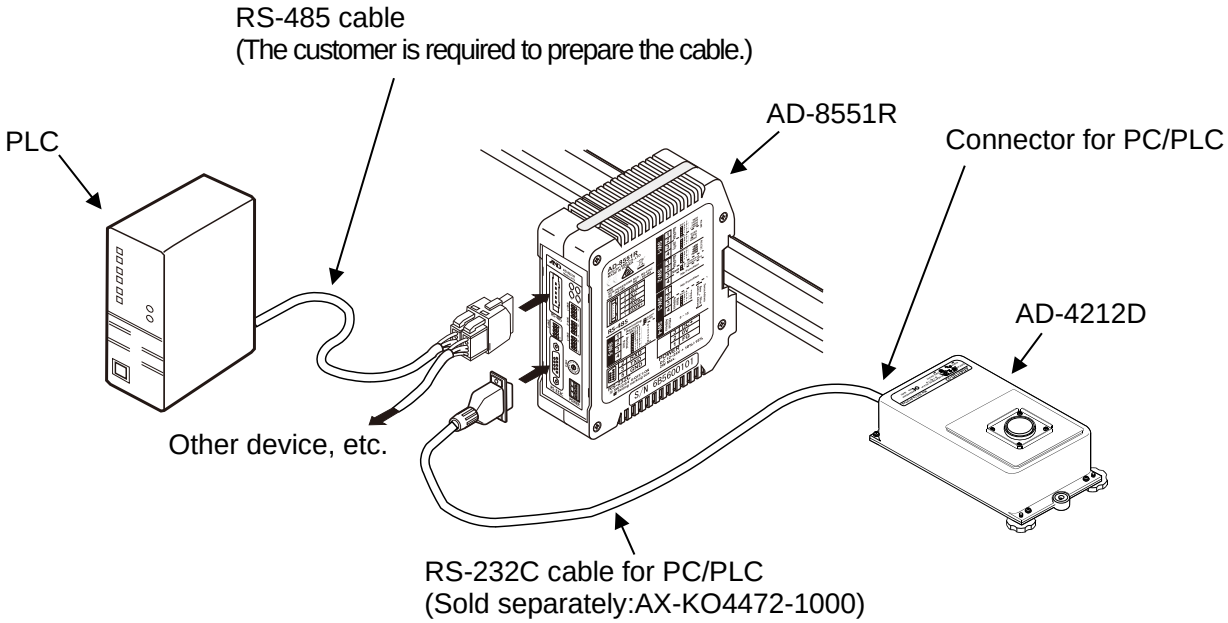


* Depending on the PLC to be connected, a converter for the D-sub 9-pin plug may be required.

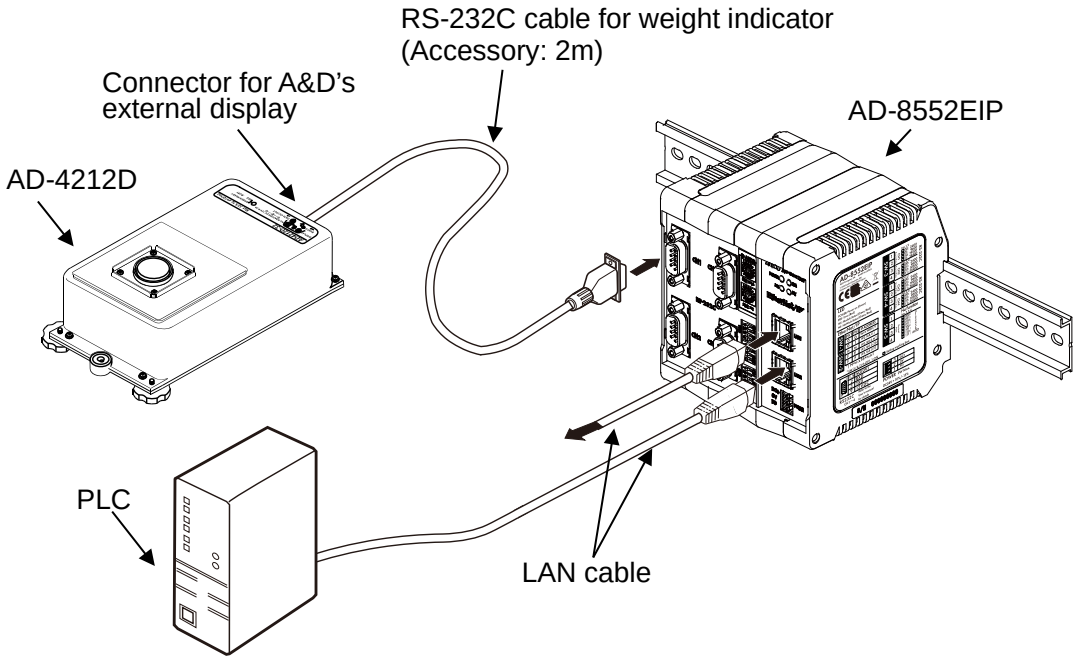
●When connecting using RS-485 (Modbus RTU mode)



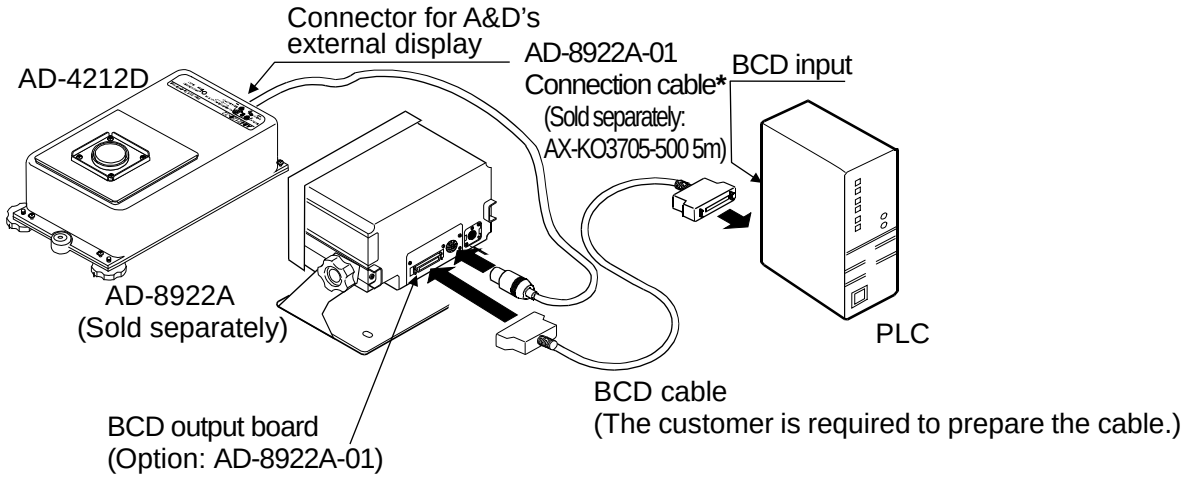
●When connecting using RS-485 (command mode)



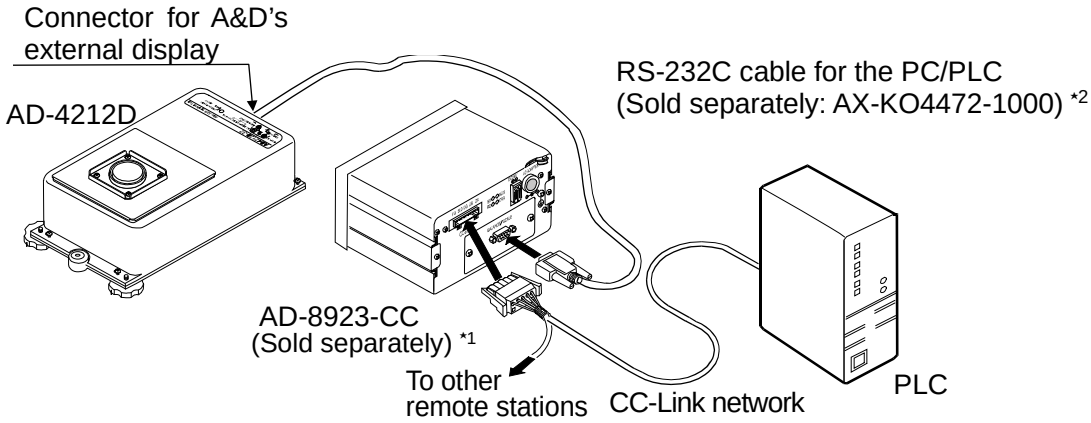
● **When connecting using LAN**



● When connecting using the BCD



● When connecting using the CC-Link



⋆1 Since the display of the AD-8923-CC is six digits, only the last six digits are displayed, but the CC-Link outputs all digits.

⋆2 You can also connect with a PC / PLC cable (sold separately: AX-KO4472-1000), but you will need to put the AD4212D in stream mode.

1.2. Compliance

Compliance with FCC Rules

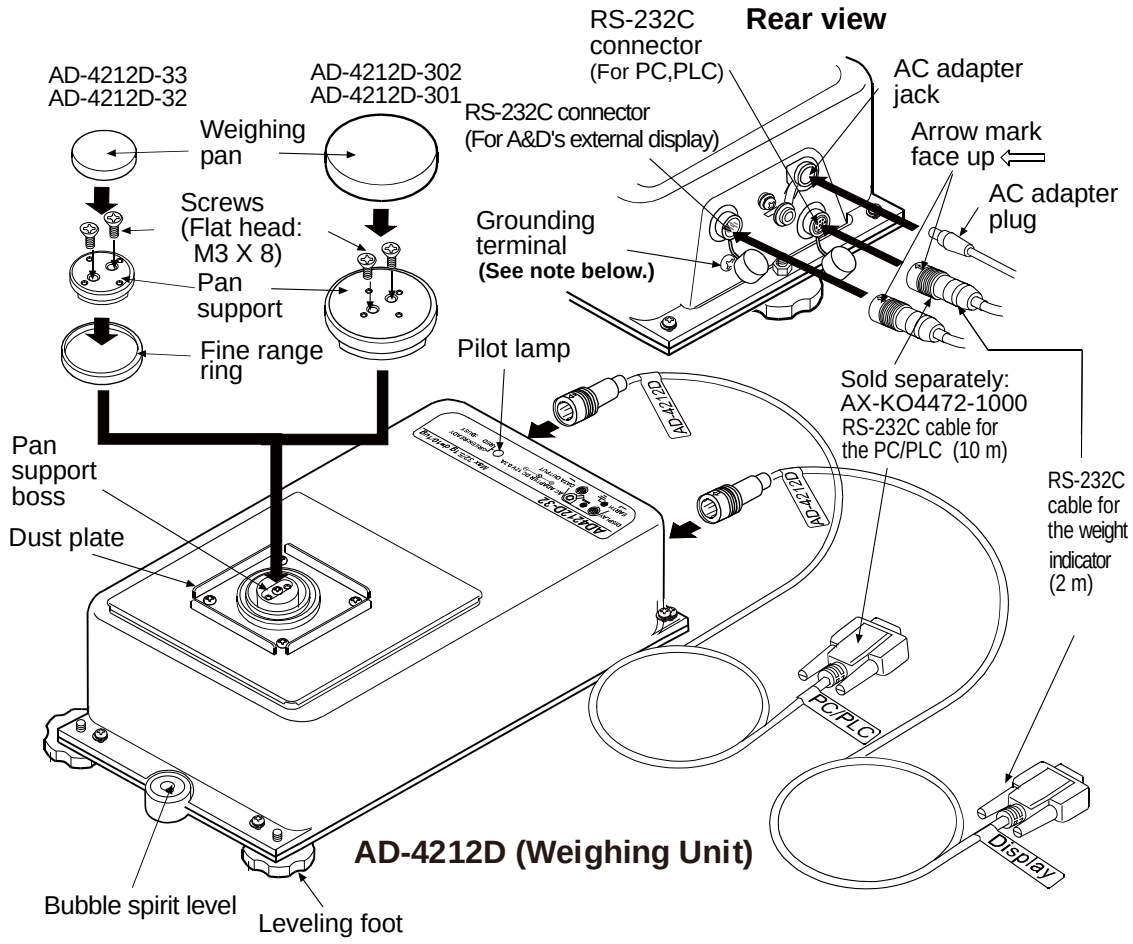
Please note that this equipment generates, uses and can radiate radio frequency energy. This equipment has been tested and has been found to comply with the limits of Class A digital devices pursuant to Part 15 of FCC rules. These rules are designed to provide reasonable protection against interference when equipment is operated in a commercial environment. If this unit is operated in a residential area, it may cause some interference and under these circumstances the user would be required to take, at his own expense, whatever measures are necessary to eliminate the interference.

(FCC = Federal Communications Commission in the U.S.A.)

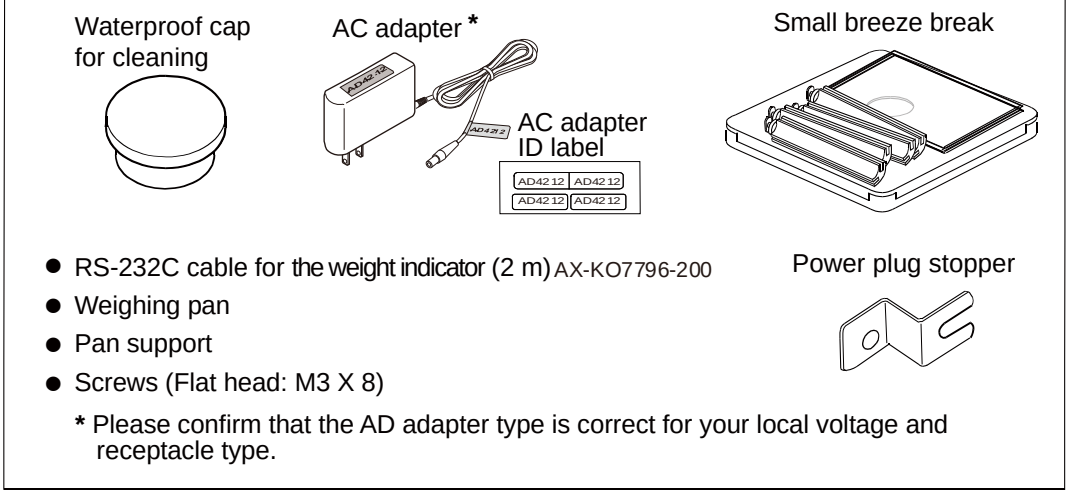
2. UNPACKING THE AD-4212D

2.1. Unpacking

- The AD-4212D is a precision instrument. Unpack the AD-4212D carefully. Keep the packing material to be used for transporting the AD-4212D in the future.
  - When unpacking, see the illustration below to confirm that everything is contained.



Accessories



- RS-232C cable for the weight indicator (2 m) AX-KO7796-200
- Weighing pan
- Pan support
- Screws (Flat head: M3 X 8)

***** Please confirm that the AD adapter type is correct for your local voltage and receptacle type.

Note

□ When the AD-4212D series weighing unit is built into a system, be sure to earth ground the weighing unit using the grounding terminal.

Caution

- □ Use the specified dedicated AC adapter for the AD-4212D
- □ Use the included AC adapter, and do not connect an AC adapter that is not compatible.
- □ If using the wrong AC adapter, the AD-4212D and other equipment may not work properly.

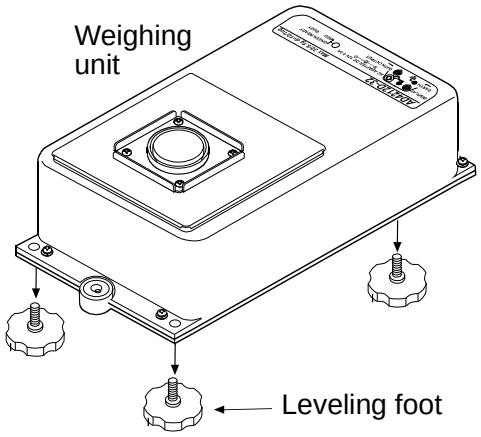
ATTACHING THE AD-4212D SERIES WEIGHING UNIT DIRECTLY ON THE MOUNTING BASE

When the AD-4212D series weighing unit is built into a system, remove the three leveling feet and use the screw holes to secure the weighing unit to the base.

Attachment Procedure

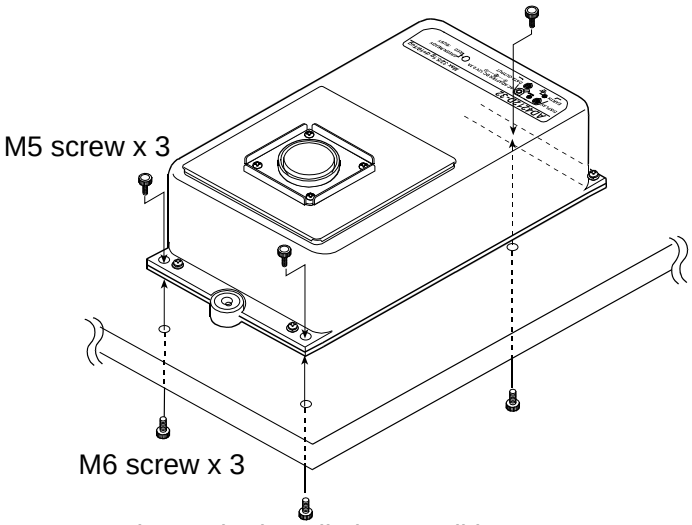
1. Remove the three leveling feet.

   Caution
   Do not remove any other screws from the bottom of the weighing unit. Doing so could damage the weighing sensor.



2. Secure the weighing unit from above. (Prepare appropriate screws with a size corresponding to an M5 screw. The screw hole diameter: 6 mm).

   In case of securing the weighing unit from the under side, use M6 screws with 1-mm pitch.



   Notes

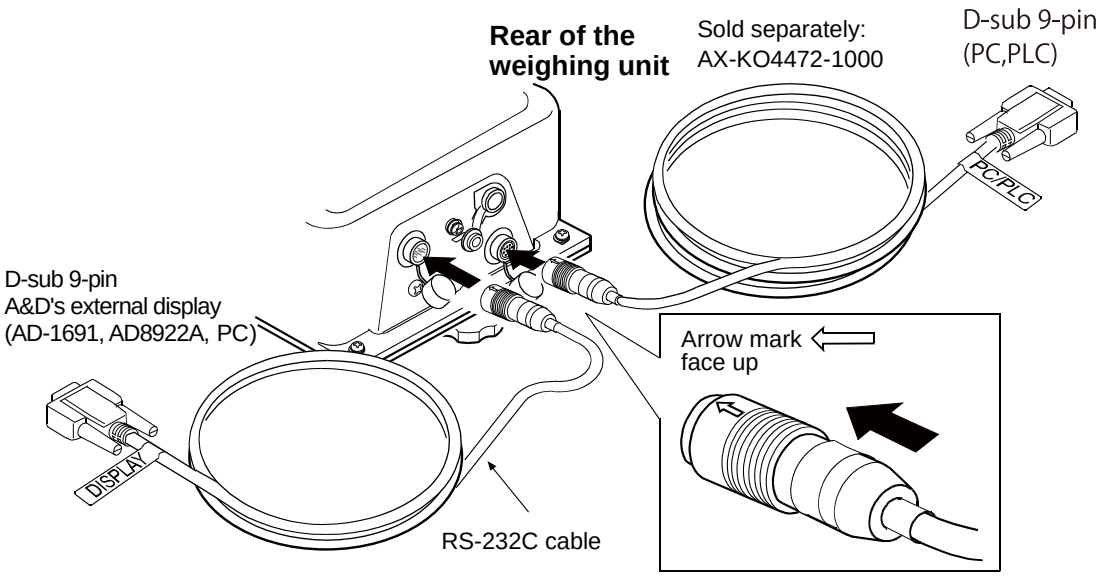
   - □ **The screws to secure the weighing unit to the mounting base are not provided.**
   - □ **For the position of the holes, refer to "11. EXTERNAL DIMENSIONS".**

   In some cases, an error in the leveling adjustment occurs due to the installation conditions.
   If this happens, place a shim between the lower surface of the weighing unit and the securing surface, or use the double-nut method with M5 or M6 nuts to adjust the height and secure the weighing unit. If the adjustment is still difficult to perform, perform sensitivity adjustment before use. That will enable the AD-4212D to function normally.

2.2. Installing the AD-4212D

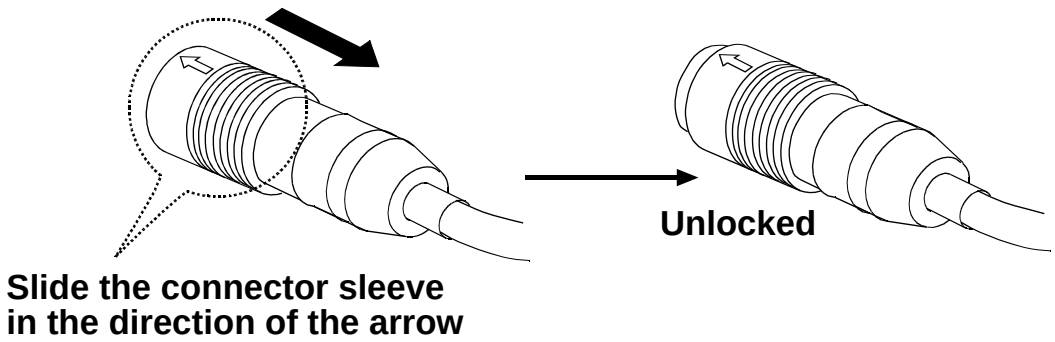
Install the AD-4212D as follows:

1. Refer to “3. PRECAUTIONS” for installing the AD-4212D.
2. Refer to "2. UNPACKING THE AD-4212D", to attach the pan support and the weighing pan on the weighing unit.
3. Insert the RS-232C cable into the jack located on the rear of the weighing unit.

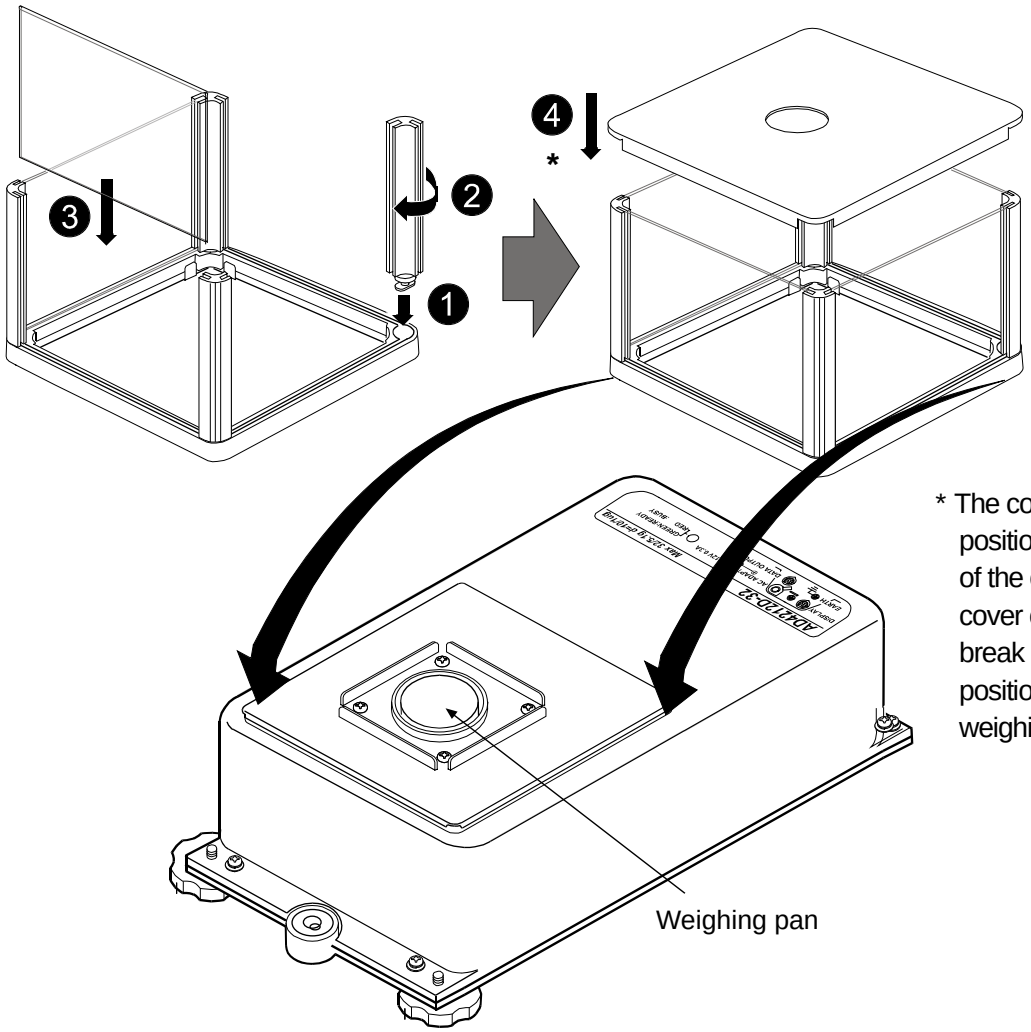


How to disconnect the cable from the weighing unit

Slide the connector sleeve in the direction of the arrow to unlock and gently pull the connector out.



4. Follow the numerical sequence to assemble the small breeze break.

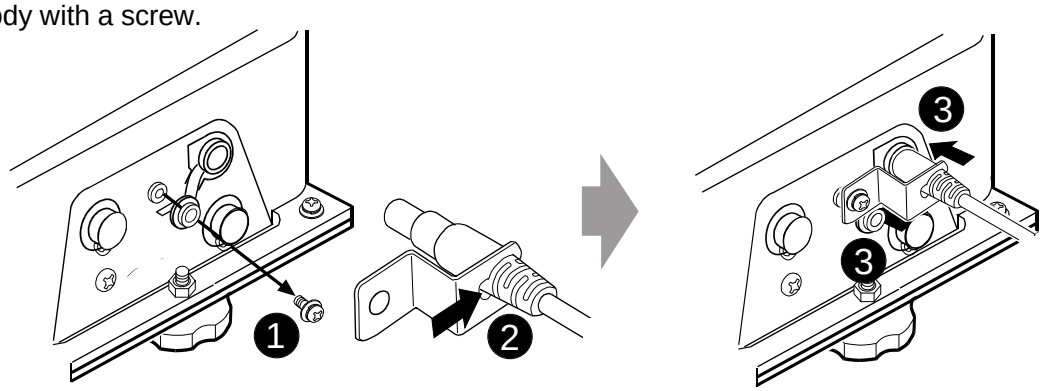


* The cover's hole is not positioned in the center of the cover. Attach the cover on the breeze break so that the hole is positioned just above the weighing pan.

5. Confirm that the AC adapter type is correct for the local voltage and power receptacle type.
6. Plug the AC adapter plug into the AC adapter jack located on the rear of the weighing unit and plug the AC adapter into the electrical outlet. Warm up the AD-4212D for one hour or more with nothing on the weighing pan.

How to use the power plug stopper

1) Remove the screw attached on the main body.
2) Insert the power plug stopper to the slit at the thickest part of the AC adapter plug.
3) Insert the AC adapter plug into the AC adapter input jack and secure the power plug stopper to the main body with a screw.



7. Set the pan unit and I/O unit to adapt to the peripheral system. Set the following for the I/O unit.
   - RS-232C (Refer to "8.STANDARD INPUT AND OUTPUT INTERFACE")

   Set the weighing speed to adapt to the ambient conditions.

Note

□ **Make sure that the personal computer is in operation before connecting to the AD-4212D.**

8. After the AD-4212D has been installed, adjust the sensitivity of the AD-4212D using the internal weight or external weight. For details, refer to "4.3. Sensitivity adjustment".

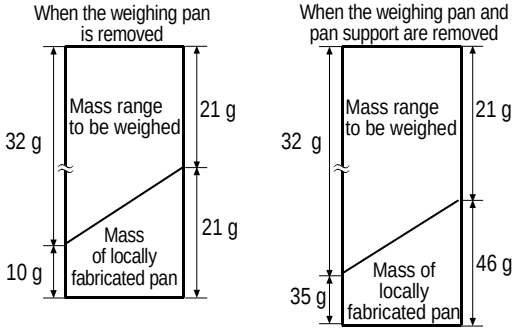
9. By removing the provided weighing pan, a locally fabricated weighing pan can be attached to the AD-4212D series by using the four screw holes on the pan support.

MASS OF THE LOCALLY FABRICATED WEIGHING PAN

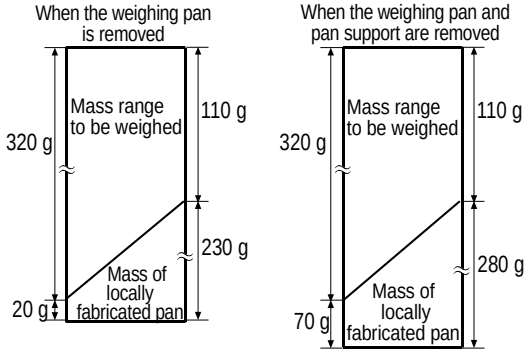
Design the weighing pan so that the mass falls within the ranges shown in the table below:

Model	Status	Mass of the weighing pan (g)
AD-4212D-33/32	Pan support is used (with weighing pan removed)	10 to 21
	Pan support boss is used (with the weighing pan and pan support removed)	35 to 46
AD-4212D-302/301	Pan support is used (with weighing pan removed)	20 to 230
	Pan support boss is used (with the weighing pan and pan support removed)	70 to 280

AD-4212D-33/32



AD-4212D-302/301



Notes

□ **If the AD-4212D is to be used in a range other than shown above, contact the local A&D dealer.**

□ **To avoid the effects of static electricity or magnetism, use materials other than resin or magnetic materials when designing a weighing pan.**

□ **When a locally fabricated weighing pan is used, the zero point may be shifted greatly right after the AC adapter is plugged in. Perform re-zero before weighing to cancel the amount of zero drift as necessary.**

Shock absorber specifications

AD4212D series have specifications that the shock absorber functions at about 800g to protect the weighing sensor.

Also, avoid giving impact shock to the weighing pan while loading.

3. PRECAUTIONS

To get the optimum performance from the AD-4212D and acquire accurate weighing data, note the following:

3.1. Before Use

- Install the AD-4212D in an environment where the temperature and humidity are not excessive. The best operating temperature is about 20°C / 68°F at about 50% relative humidity.
- Install the AD-4212D where it is not exposed to direct sunlight and it is not affected by heaters or air conditioners.
- Install the AD-4212D where it is free of dust.
- Install the AD-4212D away from equipment which produces magnetic fields.
- Install the AD-4212D in a stable place avoiding vibration and shock. Corners of rooms on the first floor are best, as they are less prone to vibration.
- Ensure a stable power source when using the AC adapter.
- Connect the power to the AD-4212D using the AC adapter at least one hour before use, but in the case of the AD-4212D-33/32, four hours are required. It is recommended to connect the power to the AD-4212D.
- Adjust the sensitivity of the AD-4212D before use or after having moved it to another location. In addition, adjust the sensitivity of it periodically to maintain the accuracy. (Refer to "4.3. Sensitivity adjustment" for details.)

Caution

Do not install the weighing unit where flammable or corrosive gas is present.

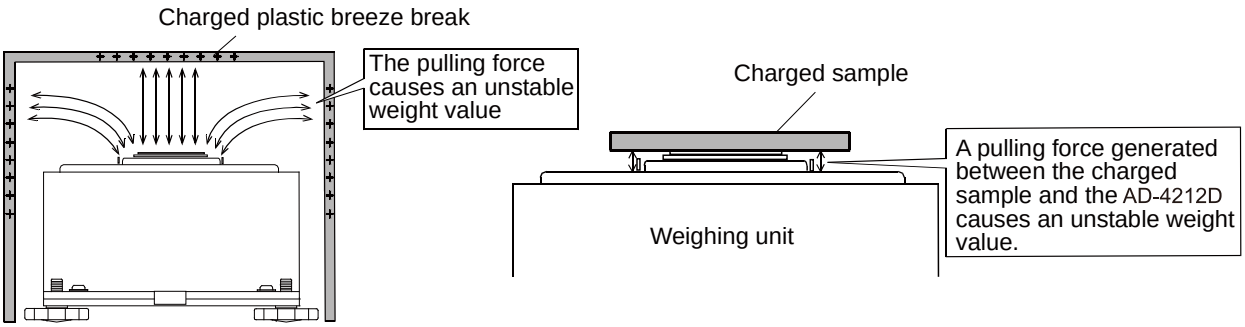
3.2. When Building Into a System

● Errors due to a static charge and measures to take

When the ambient humidity is 45% RH or less, insulators such as plastic or glass are prone to static electricity. When charged material comes close to the AD-4212D, a pulling force is generated by static induction between the charged material and the weighing pan. This causes the weighing value to be unstable.

To protect the AD-4212D from malfunction due to discharging of the charged material when it comes close to the AD-4212D, be sure to earth ground the AD-4212D (weighing unit) and the display unit.

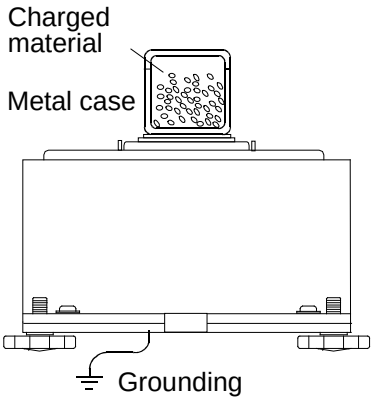
Note that static electricity generated by static induction will not be canceled by earth-grounding. Use a humidifier or a DC static eliminator such as the AD-1683.



Measures to take (Plastic is used in the examples below. They can be applied to glass, too.)

□ When the sample or devices are plastic

- Use a static eliminator that generates no air blow such as the AD-1683, DC static eliminator, to remove static electricity.
- Place the sample in a container that is made of a conductive material such as metal and that can be sealed, and then weigh it.



□ When the sample is powdery

- When the AD-4212D is used in combination with a feeder for batch weighing of powdery samples, samples may be charged by rubbing sample particles against each other.
  Use a static eliminator and perform weighing while removing static electricity.

□ When the sample container is made of material that is prone to static electricity such as plastic

- Cover the outside of the container with a metal such as aluminum foil.
- Apply an anti-static agent onto the container.

□ When making a breeze break using plastic

- Apply an anti-static agent onto the breeze break.
- Use a conductive acrylic fiber.

□ When plastic exists in the AD-4212D installation site

- Cover the plastic with a grounded conductive material.
- Apply an anti-static agent onto the plastic.

□ When an operator is static charged

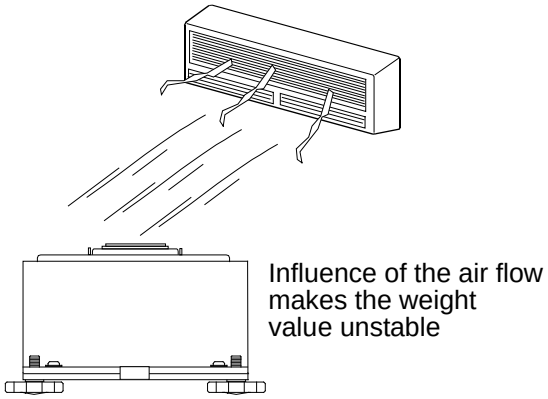
If an operator's clothes are static charged, especially in winter, it may be a cause for unstable weighing values.

- Wear an anti-static wrist strap.

● Errors due to air flow and measures to take

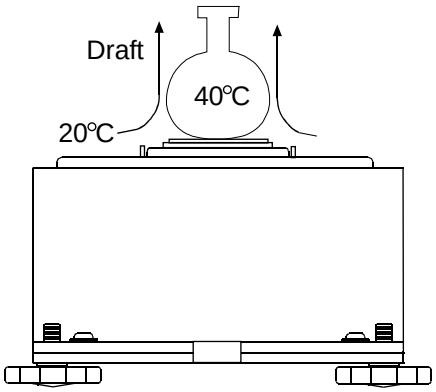
□ Where the influence of ambient air flow is great such as: close to an air conditioner or fan, door or passage way. Even very subtle air flow that is hard to be detected may influence the weighing operation.

- Avoid those areas as a weighing site.
- If weighing is to be performed in such an area, use a breeze break or take other appropriate measures.



□ Where the influence of heat or drafts is great

- Eliminate temperature differences between a sample and the environment.
  When a sample is warmer (cooler) than the ambient temperature, the sample will be lighter (heavier) than the true weight. This error is due to a rising (falling) draft around the sample.
- Do not touch the sample directly with your hand. Use tweezers or other tools.
  If you touch the sample, the same type error described above will occur.
- Do not perform weighing where it is exposed to direct sunlight. Weighing errors may occur due to sudden temperature change or drafts.



● Errors due to vibration and measures to take

□ Where the influence of vibration is great, such as:

(1) Soft ground (2) Second or higher floor (3) Near center of a floor far from pillars (4) Seismic isolated structures (5) Near tall buildings.

In the areas listed above, the AD-4212D may yield unstable weighing values on windy days or after an earthquake. Especially in case of (4) and (5), weighing values may be unstable for a long period of time because of long lasting low-frequency vibration after strong winds or an earthquake.

● Errors due to other causes and measures to take

□ Change in temperature or humidity

A sudden change in temperature or humidity can generate a draft and cause the AD-4212D to absorb or exude moisture, which leads to unstable displays.

- Avoid sudden change in temperature or humidity.
- Use an air conditioner or humidifier to control the temperature or humidity.

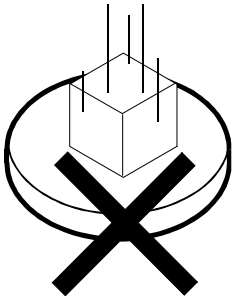
□ Magnetic material

The AD-4212D uses a strong magnet as part of the weighing system, so use much care when weighing magnetic materials.

- Place a non-magnetic object such as aluminum or brass between the sample and the AD-4212D to keep an appropriate distance between them while weighing.

3.3. During Use

- To minimize the affect by electrical noises, earth ground the AD-4212D (weighing unit) and the display unit (option).
- Do not drop things upon the weighing pan, or place a sample on the pan that is beyond the AD-4212D weighing capacity. Place a sample in the center of the weighing pan to minimize corner-load errors.
- To prevent possible errors, before each weighing, perform re-zero using the RS-232C command, or calculate the difference between the weighing value before and after weighing.



- Take into consideration the affect of air buoyancy on a sample when measuring the absolute value with the readability of 0.1 mg.
- While cleaning, attaching the waterproof cap to the unit instead of the weighing pan results in the AD-4212D becoming dust-proof and drip-proof and conforming to IP65. Be sure to clean the weighing pan and keep the conditions around the pan clean after weighing powdery, fluid samples or metallic strips.
- AD-4212D status is indicated by the pilot lamp.

Lamp status	AD-4212D status
Turned off	The power with the AD-4212D is not turned on.
Green	Weighing mode
Red	When turning on the power, when an error has occurred, or during a re-zero or sensitivity adjustment

3.4. After Use

- Avoid mechanical shock to the AD-4212D.
- Periodically adjust the sensitivity of the AD-4212D using the internal weight or an external weight.
- Do not disassemble the AD-4212D. Contact the local A&D dealer if the AD-4212D needs service or repair.
- Do not use organic solvents to clean the AD-4212D. Clean the AD-4212D with a lint free cloth that is moistened with warm water and a mild detergent.
- Avoid dust and water so that the AD-4212D weighs correctly. Protect the internal parts from liquid spills and excessive dust.

3.5. Power Supply

- When the AC adapter is connected, the AD-4212D is in the standby mode if the standby indicator is on (refer to “4. BASIC OPERATION”). This is a normal state and does not harm the AD-4212D. For accurate weighing, plug in the AC adapter and warm up the AD-4212D for the appropriate duration before use.

4. BASIC OPERATION

By using the external displays (AD-8922A, AD-8923-CC/BCD, AD-1691) and the Windows software "WinCT-AD4212D," the following operations can be performed.

- Weighing value display.
- Sensitivity adjustment
- Changing of the readability
- Changing of the weighing speed (Response)
- Re-zero

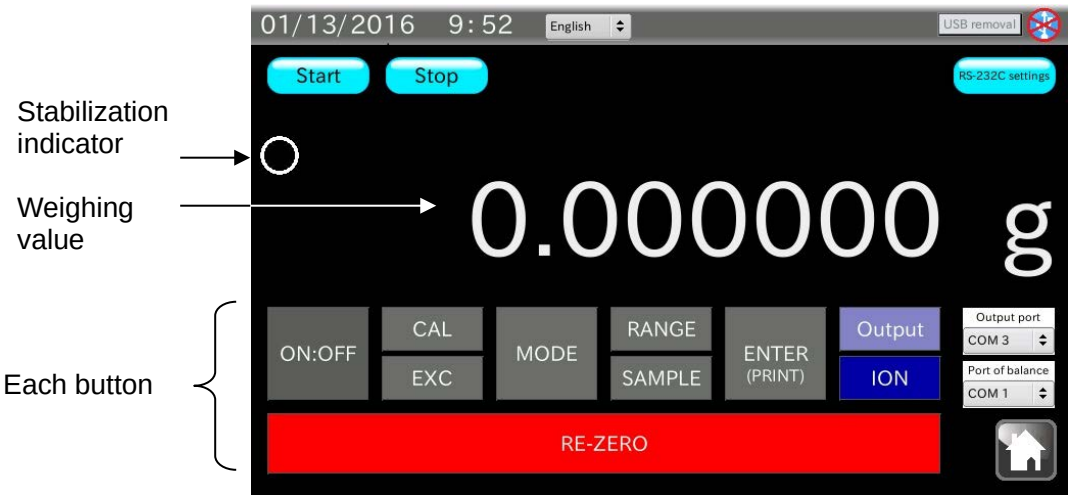
4.1. When Using the AD-1691

For details on the AD-8922A, AD-8923-CC/BCD, and WinCT-AD4212D, please refer to their respective instruction manuals.

Preparations before use

1. Connect the RS-232C connector for the A&D's external display to the AD1691's arbitrary RS-232C connector using the cable.
   * Factory setting of the AD1691 is set to COM1.
2. Connect the AD-4212D to the power using the AC adapter to turn the power on and put the AD-4212D to weighing mode.
3. Connect the AD-1691 to the power using the AC adapter and turn the power on.
4. Perform functions as the Balance remote controller from the home screen.
5. Touch the Start button to display the weighing value.
   * AD-4212D weighing indicator RS-232C has a fixed 2400bps baud rate with parity-even and data bits-7 bits.

Descriptions for the display and buttons



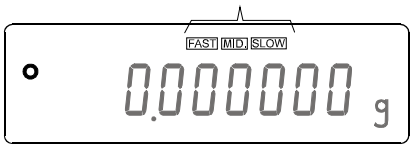
Button	Function
ON:OFF	Toggles between the weighing mode and standby mode.
CAL	Performs the sensitivity adjustment using the internal weight.
EXC	Performs the sensitivity adjustment using the external weight.
MODE	Changes the weighing speed (Response speed).
RANGE / SAMPLE	Changes the readability.
ENTRE(PRINT)	Outputs the weighing value from the RS-232C external output port of the AD-1691.
RE-ZERO	Sets the display value to zero.
Output	Outputs the current weighing value.
ION	Has no function.

4.2. Changing the Weighing Speed

The weighing speed can be selected from the following three rates to minimize the influence on weighing that is caused by drafts and or vibration at the place where the AD-4212D is installed.

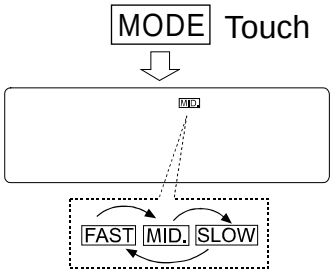
Indicator	Speed	Stability
FAST	Fast	Sensitive value
MID.	⬆	⬇
SLOW	Slow	Stable value

Display example on the AD-1691
Weighing speed setting



Operation

1. Touch the MODE button to select a weighing speed. Either FAST, MID. or SLOW can be selected.



MODE Each touching switches the indicators

4.3. Sensitivity Adjustment

Sensitivity adjustment

Sensitivity adjustment using the internal weight or an external weight.
Sensitivity adjustment can be done without removing the special plate or jig attached to the weighing plate. (However, this only applies if the total of the special plate and jig and the weight used does not exceed the capacity of the AD-4212D.)

Caution

- Do not allow vibration or drafts to affect the AD-4212D during sensitivity adjustment.

Caution on using an external weight

- The accuracy of the weight can influence the accuracy of weighing. Select an appropriate weight as listed below.

Model	Usable weight
AD-4212D-33/32	1g, 2g, 5g, 10g, **20g**, 30g
AD-4212D-302/301	10g, 20g, 50g, 100g, **200g**, 300g

The weight in bold type: factory setting

Display



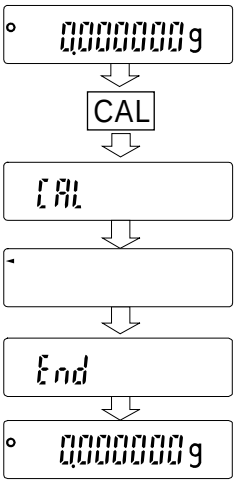
- This indicator means “the AD-4212D is measuring sensitivity adjustment”. Do not allow vibration or drafts to affect the AD-4212D while this indicator is displayed.

4.4. Sensitivity Adjustment Using the Internal Weight

This function adjusts the sensitivity of the AD-4212D.

1 Connect the AC adapter and warm up the AD-4212D for at least one hour with nothing on the weighing pan.

Display example on the AD-1691



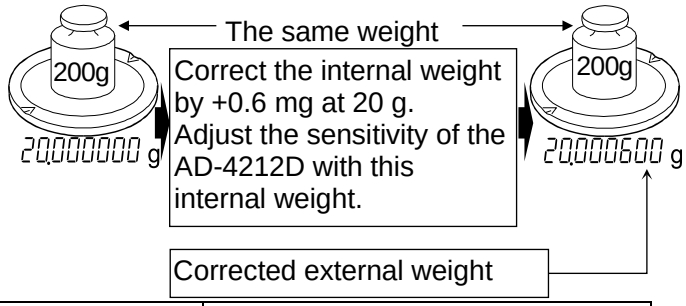
2 Touch the [CAL] key to display [CAL] .

3 The AD-4212D adjusts the sensitivity using the internal weight. Do not allow vibration or drafts to affect the AD-4212D.

4 The AD-4212D will automatically return to the weighing mode after sensitivity adjustment.

4.5. Correcting The Internal Weight value

□ The AD-4212D can correct the internal weight value within the range shown below. This function corrects the internal weight value to conform to an external weight. The corrected weighing value is maintained in non-volatile memory even if the AC adapter is removed. The internal weighing value is corrected as follows:



Model	The internal weight	The normal range
AD-4212D-33/32	20 g	±5.000 mg
AD-4212D-302	100 g	±5.00 mg
AD-4212D-301	100 g	±5.0 mg

Example: 20.000000 g is corrected to +0.6 mg (20.000600 g). When using a 10 g external weight by +0.6 mg for the correction, and the weight changed to 20 g, the correction value is +1.2 mg.

1 Perform one-touch sensitivity adjustment. Weigh an external weight and get the correction value.

2 Connect the AD-4212D to a PC using the RS-232C.

3 Transmit a CS command to the AD-4212D from the PC.

Example) If correcting with + 0.6 mg, transmit "CS:+0.6␣mg" to the AD-4212D. ("␣" means space)

If correcting with - 0.0020 mg, transmit "CS:+0.0020␣␣mg" to the AD-4212D.

4 Perform the sensitivity adjustment using the internal weight.

5 Place an external weight on the weighing pan to confirm that the correction was properly performed. If the proper value cannot be obtained, readjust the correction value.

* To confirm the currently corrected value, transmit ?CS command to the AD-4212D from the PC.

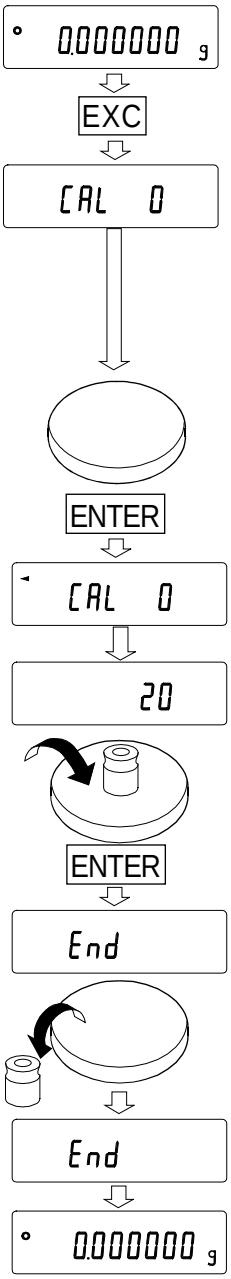
4.6. Sensitivity adjustment Using An External Weight

Sensitivity adjustment procedure

By connecting to WinCT-AD4212B or AD-1691,the sensitivity of the AD-4212D can be adjusted using external weights.

Operation

1. Plug in the AC adapter and warm up the AD-4212D for 30 minutes or more with nothing on the pan.



2. Touch the EXC button. CAL 0 is displayed.

- If you want to cancel the sensitivity adjustment, touch the CAL button. The AD-4212D will return to the weighing mode.
- If you want to change the displayed weight value , press the SAMPLE button. Touch the RE-ZERO button to select the weight value, and touch the ENTER button to store it. CAL 0 is displayed.

3. Confirm that there is nothing on the pan and touch the ENTER button. The AD-4212D measures the zero point. Do not allow vibration or drafts to affect the AD-4212D.
   The AD-4212D displays the value of the external weight.

4. Place an external weight of the displayed weight value on the pan, and touch the ENTER button. The AD-4212D measures the external weight. Do not allow vibration or drafts to affect the AD-4212D.

5. The AD-4212D displays End. Remove the weight from the pan.

6. The AD-4212D will automatically return to the weighing mode.

7. Place the external weight on the pan and confirm that sensitivity adjustment was performed correctly. If not, check the ambient conditions such as drafts or vibration, and repeat steps 2 through 7.

5. SMART RANGE FUNCTION

The AD-4212D-32 is equipped with two ranges. The precision range has a higher resolution. The standard range has a normal resolution.

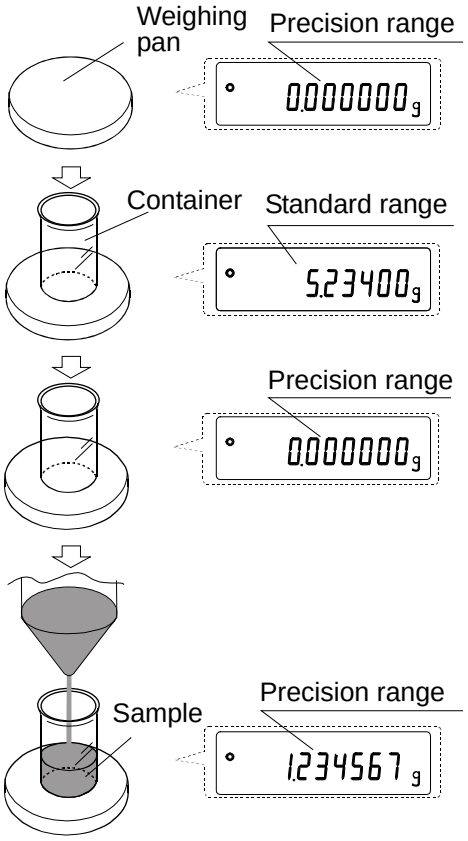
The range switches automatically depending on the value displayed. Touching the RE-ZERO button or sending the R command allows weighing in the precision range regardless of the tare value. The range can be fixed to the standard range by changing the readability using the RE-ZERO button or R command.

1 Touch the RE-ZERO button or send the R command.
The AD-4212D will start weighing, using the precision range.

2 Place a container on the weighing pan.
The weighing value exceeds the precision range value and the AD-4212D will switch to the standard range.

3 Touch the RE-ZERO button or send the R command.
The AD-4212D will switch to the precision range.

4 Place a sample in the container.
The weighing value is within the precision range value and the AD-4212D will perform a weighing, using the precision range.



Precision range/standard range

Model	Range used	Weighing range	Available readability
AD-4212D-32	Precision range*	0 g to 5.1 g	0.000001g (0.001mg)
	Standard range	5.1 g to 32 g	0.00001g (0.01mg)

● The factory setting is the precision range.

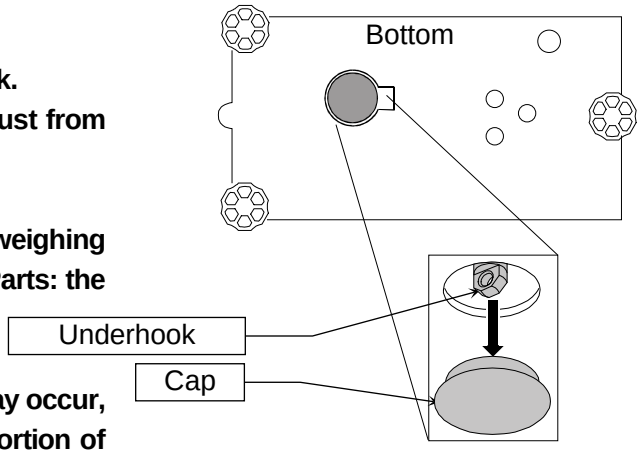
***** When the weighing value exceeds 5.1 g while the readability of 0.000001 g (precision range) is used, the AD-4212D will switch to the readability of 0.00001 g (standard range). By touching the RE-ZERO button or sending the R command, the AD-4212D can weigh from that point up to 5.1 g, using the readability of 0.000001 g (precision range).

6. UNDERHOOK

The underhook can be used for magnetic materials or density measurement. The built-in underhook is revealed by removing the cap on the bottom of the AD-4212D. Use the underhook as shown below.

Caution

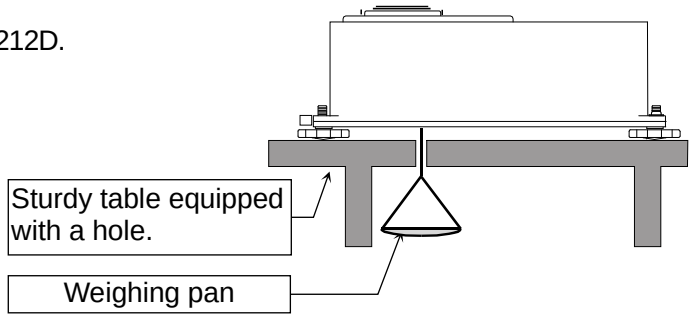
- **Do not apply excessive force to the underhook.**
- **When not in use, attach the cap to prevent dust from getting into the AD-4212D.**
- **Do not push the underhook upward**
- **When turning the AD-4212D over, parts and weighing matter in the weighing chamber will fall off. (Parts: the weighing pan and fine range ring) Remove them first.**
- **When the cap is removed, a weighing error may occur, because of drafts entering into the internal portion of the AD-4212D. Arrange the room condition.**



How to use

1 Remove the cap on the bottom of the AD-4212D.

2 Hang your weighing pan on the underhook.
Place the AD-4212D on the solid table.



7. FUNCTION TABLE

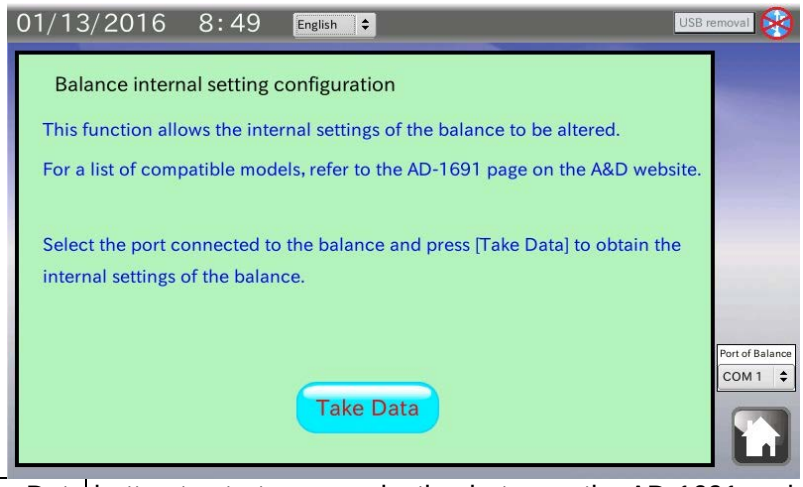
The function table reads or rewrites the parameters that are stored in the AD-4212D.
These parameters are maintained in non-volatile memory, even if the AC adapter is removed.
The function table menu consists of two layers. The first layer is the "Class" and the second layer is the "Item".

7.1. How to set

Using WinCT-AD4212D, the weighing environment analyzer AD-1691, or operating the AD-1691 via commands from a PC/PLC enables changes or confirmation of function settings.
When using WinCT-AD4212D, please refer to the WinCT-AD4212D Operation Manual.
When making changes via PC/PLC commands, please refer to “8.2. Commands”.
Using the provided AD-1691 weighing environment analyzer as a remote controller enables changes or confirmation of function settings.

When using the AD-1691

1. Connect the RS-232C connector for the A&D's external display to the AD-1691's arbitrary RS-232C connector using the cable.
2. Connect the AD-4212D to the power using the AC adapter to turn on the power and have the AD-4212D enter the weighing mode.
3. Connect the AD-1691 to the power using the AC adapter and turn the power on.
4. Perform the balance internal setting configuration at the AD-1691.



5. Touch the Take Data button to start communication between the AD-1691 and AD-4212D.
6. The screen shows the function settings list.



7. Click the arrow mark to change the setting values.
   * The changed contents have yet to be confirmed at this step.
8. Touch the Confirm button to start the communication and change the weighing unit function settings. The device will be restarted when the setting changes were ended.

7.2. Details Of The Function Table

Class	Item and Parameter		Description	
bASFnc Environment Display	Cond Condition	0	Fast response, sensitive value	FAST. Can be changed by response adjustment.
		▪ 1		MID.
		2	Slow response, stable value	SLOW
	St-b Stability band width	0	Stable range is ±1 digit	The stabilization indicator illuminates when the display fluctuation is within the range.
		▪ 1	±2 digit #1	
		2	Stable range is ±3 digits	
	trc Zero tracking	0	OFF	Keeps zero display by tracking zero drift.
		▪ 1	Normal	
		2	Strong	
		3	Very strong	
	SPd Display refresh rate	▪ 0	5 times/second #3	Period to refresh the display
		▪ 1	10 times/second #3	
	Pnt Decimal point	▪ 0	Point (.)	Decimal point format
		1	Comma (,)	
	Unit Unit	▪ 0	g (gram)	
		1	mg (milligram)	
dout Data output #4	Prt Data output mode	▪ 0	Normal mode	Outputs data by commands.
		1	Auto print mode A Reference = zero	Outputs data when the display is stable and conditions of AP-P, AP-b and the reference value are met.
		2	Auto print mode B Reference = last stable value	
		3	Stream mode / Interval mode	
	AP-P Auto print polarity	▪ 0	Plus only	Displayed value > Reference
		1	Minus only	Displayed value < Reference
		2	Both	Regardless of displayed value
	AP-b Auto print difference	0	10 digits	Difference between reference value and displayed value #2
		▪ 1	100 digits	
		2	1000 digits	

▪ : Factory settings.

#1 The unit of readability is digit.
Example: If 1 mg display is selected touching the RANGE button for the AD-4212D-301, 1 mg is one digit.

#2 Usable readability of the AD-4212D is one digit.
Example: In gram display, one digit is 0.00001 mg for the AD-4212D-302 and 0.0001 mg for the AD-4212D-301.

#3 Factory settings of the AD-4212D-33 and AD-4212D-32 is set to 5 times per second.
Factory settings of the AD-4212D-302 and AD-4212D-301 is set to 10 times per second.

#4 These items apply only for RS-232C output for the PC or PLC.

#5 The commands can be used in all modes.

Class	Item and Parameter		Description	
out Data output #4	int Interval time	▪ 0	Every measurement	Interval time in the interval memory mode when using Prt 3
		1	2 seconds	
		2	5 seconds	
		3	10 seconds	
		4	30 seconds	
		5	1 minutes	
		6	2 minutes	
		7	5 minutes	
		8	10 minutes	
	S-td Time/Date output	▪ 0	No output	Selects whether or not the time or date is added to the weighting data.
		1	Time only	
		2	Date only	
		3	Time and date	
	S- id ID number output	▪ oFF	No output	Selects whether or not the ID number is output.
		on	Output	
	PUSE Data output pause	▪ oFF	No pause	Selects the data output interval.
		on	Pause (1.6 seconds)	
	At-F Auto feed	▪ oFF	Not used	Selects whether or not automatic feed is performed.
		on	Used	
	Ar-d Zero after output	▪ oFF	Not used	Adjusts zero automatically after data is output
		on	Used	
	S-tP Temperature output	▪ oFF	Not output	Adds temperature to data output
		on	Output	
S iF Serial interface #4	bPS Baud rate	0	600 bps	
		1	1200 bps	
		▪ 2	2400 bps	
		3	4800 bps	
		4	9600 bps	
		5	19200 bps	
	btPr Data bit, parity bit	▪ 0	7 bits, even	
		1	7 bits, odd	
		2	8 bits, none	
	CrLF Terminator	▪ 0	CR LF	CR: ASCII code 0Dh LF: ASCII code 0Ah
		1	CR	
	tYPE Data format	▪ 0	A&D standard format	Refer to "7.5. Description Of The Item "Data Format ".
		1	DP format	
		2	KF format	
		3	MT format	
		4	NU format	
		5	CSV format	
	t-UP Timeout	oFF	No limit	Selects the wait time to receive a command.
		▪ on	1 second	
	ErCd AK, Error code	▪ oFF	No output	AK: ASCII code 06h
		on	Output	

▪ : Factory settings.

Caution The AD-4212D may not transmit the data completely at the specified refresh rate, depending on the baud rate or data added to the weighing data such as time, date and ID number.

#4 These items apply only for RS-232C output for the PC or PLC.

7.3. Description Of The Class "Environment, Display"

Condition (Cond)

Cond 0 This parameter is for sensitive response to the fluctuation of a mass value. Used for powder target mass, weighing a very light sample or when quick response weighing is required.



Cond 2 This parameter is for stable weighing with slow response. Used to prevent a mass value from drifting due to vibration or drafts.

Notes **In automatic response adjustment, this parameter is selected automatically.**

Stability band width (St-b)

This item controls the width to regard a mass value as a stable value. When the fluctuation per second is less than the parameter, the AD-4212D displays the stabilization indicator and outputs. The parameter influences the "Auto print mode". Currently displayed readability means 1 digit.

Example) If the RANGE button was touched to select the 1 mg display at the AD4212D-301, 1 mg means 1 digit.

St-b 0 This parameter is used for sensitive response of the stabilization indicator. Used for exact weighing.



St-b 2 This parameter ignores slight fluctuations of a mass value. Used to prevent a mass value from drifting due to vibration or drafts.

Zero tracking (trc)

This function tracks zero point drift caused by changes in the environment and stabilizes the zero point. When the weighing data is only a few digits, turn the function off for accurate weighing.

trc 0 The tracking function is not used. Used for weighing a very light sample.

trc 1 The normal tracking function is used.

trc 2 The strong tracking function is used.

trc 3 The very strong tracking function is used. Used for stable zero display.

Display refresh rate (SPd)

The periodic time to refresh the display. This parameter influences "Baud rate", "Data output pause" and the data output rate of "Stream mode".

Decimal point (Pnt)

The decimal point format can be selected.

7.4. Description Of The Item "Data Output Mode"

The parameter setting of "Data output mode (Prt)" applies to the performance when the data is transmitted using the RS-232C interface.

Normal mode

The output is performed only when receiving a command such as a Q command.

Required setting	dout	Prt 0	Normal mode

Auto print modes A and B

When the displayed value is stable and the conditions of "Auto print polarity", "Auto print difference" and reference value are met, the AD-4212D outputs the weighing data once.

Auto print mode A

Example	For weighing each time a sample is placed and removed, with "Ar-d" set to "on" (to adjust zero after the data is output).		
Required setting	dout	Prt 1	Auto print mode A (reference = zero)
	dout	AP-P	Auto print polarity
	dout	AP-b	Auto print difference
	dout	Ar-d on	Zero after output

Auto print mode B

Example	For weighing while a sample is added.		
Required setting	dout	Prt 2	Auto print mode B (reference = last stable value)
	dout	AP-P	Auto print polarity
	dout	AP-b	Auto print difference

Stream mode

The AD-4212D outputs the weighing data continuously regardless of the display condition. When the display refresh rate is set to 5 times / second (SPd 0), the data output rate is also set to the same 5 times / second.

Example	For monitoring data on a computer.		
Required setting	dout	Prt 3	Stream mode
	bASFnc	SPd	Display refresh rate
	S iF	bPS	Baud rate

Caution **The AD-4212D may not transmit the data completely at the specified refresh rate, depending on the baud rate or time, date and ID number appended to the weighing data.**

Interval mode

The weighing data is periodically output.

Example	In case of monitoring the weighing value periodically, the time and date can be added to the weighing data depending on settings of S-td.		
Required setting	dout	Prt 3	Interval mode
	dout	int	Interval time

7.5. Description Of The Item "Data Format"

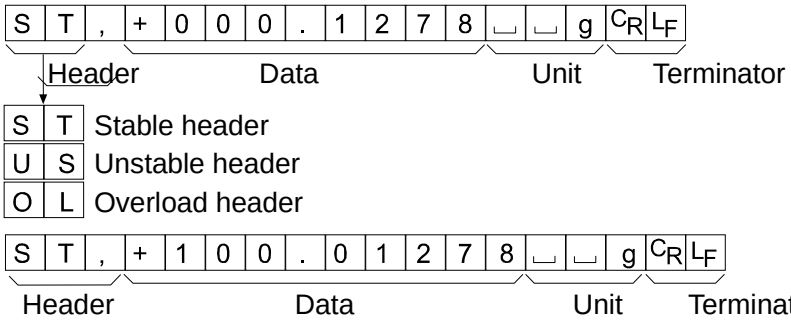
* The output data format applies only to RS-232C output for the PC or PLC.

A&D standard format

SIF TYPE 0

This format is used when the peripheral equipment can receive the A&D format.

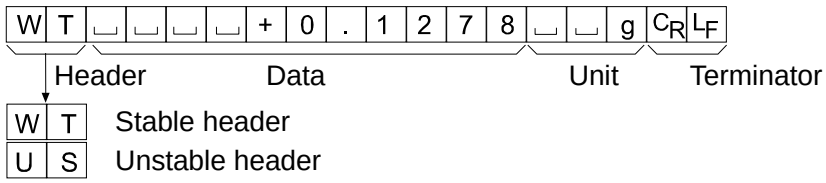
- This format consists of fifteen or sixteen characters excluding the terminator.
  When numerical characters without decimal point are eight characters for the AD-4212D-33, AD-4212D-32 and AD-4212D-302, the format becomes sixteen characters.
- A header of two characters indicates the AD-4212D condition.
- The polarity sign is placed before the data with the leading zeros. If the data is zero, the plus sign is applied.
- The unit, consisting of three characters, follows the data.



DP (Dump print) format

SIF TYPE 1

- This format consists of sixteen characters excluding the terminator.
- A header of two characters indicates the AD-4212D condition. No overload header is used.
- The polarity sign is placed before the data, with spaces in place of leading zeros, if the data is not zero or overloaded.
- The unit, consisting of three characters, follows the data.

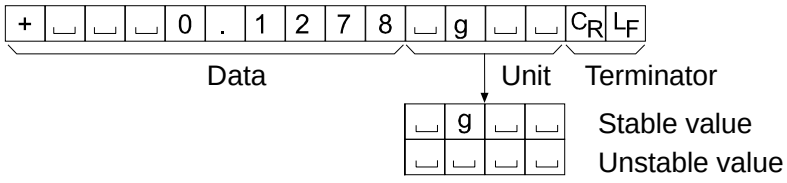


KF format

SIF TYPE 2

This is the Karl-Fischer moisture meter format and is used when the peripheral equipment can only communicate using this format.

- This format consists of fourteen characters excluding the terminator.
- This format has no header characters.
- The polarity sign is placed before the data, with spaces in place of leading zeros, if the data is not zero or overloaded.
- This format outputs the unit only for a stable value.



MT format

SIF TYPE 3

This format is used when the peripheral equipment of other manufacturer is connected. Please note that the connection is not guaranteed.

- A header of two characters indicates the AD-4212D condition.
- The polarity sign is used only for negative data.
- The weighing data uses spaces in place of the leading zeros.
- The character length of this format changes dependent upon the unit

S	␣	␣	␣	␣	␣	0	.	1	2	7	8	␣	g	CR	LF

Header Data Unit Terminator

S ␣	Stable header
S D	Unstable header
S I	Overload header

NU (numerical) format

SIF TYPE 4

This format outputs only numerical data.

- This format consists of ten characters excluding the terminator.
- The polarity sign is placed before the data with the leading zeros. If the data is zero, the plus sign is used.

+	0	0	0	0	.	1	2	7	8	CR	LF

Data Terminator

CSV format

SIF TYPE 5

- This format separates the data of A&D standard format and the unit by a comma (,).
- This format outputs the unit even when the data is overloaded.
- When a comma (,) is selected for the decimal point, the separators are set to semicolon (;).
- When the ID number, time and date are added at "Data output (dout)" of the function table, outputs ID number, date, time and weighing data in this order and separates each item by a comma and treats all the items as one group of data.

LAB-0123, 2004/07/01, 12:34:56, ST,+0000.1278,␣␣g<CR><LF>

ID number Date Time Weighing data

S	T	,	+	0	0	0	.	1	2	7	8	,	␣	␣	g	CR	LF
O	L	,	+	9	9	9	9	9	9	9	E	+	1	9	,	␣	␣	g	CR	LF

ID number

dout S-id on

The number to identify a specific AD-4212D.

- This format consists of eight characters excluding the terminator.

L	A	B	-	0	1	2	3	CR	LF

Date

dout S-td 2 or 3

- The date output order can be changed in " Time/Date output (S-td)" .
  The year is output in a four-digit format.

2	0	1	5	/	0	9	/	0	1	CR	LF

Time

dout S-td 1 or 3

- This format outputs time in 24-hour format.

1	2	:	3	4	:	5	6	C_R	L_F

Temperature

dout S-tP on

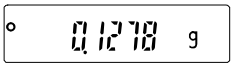
- This format outputs temperature. The unit is "C".

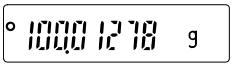
Caution Humidity and air pressure are not output.

+	0	2	3	.	4	␣	␣	C	C_R	L_F

7.6. Data Format Examples

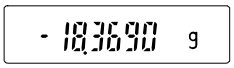
Stable

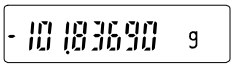




A&D	S	T	,	+	0	0	0	.	1	2	7	8	␣	␣	g	CR LF
	S	T	,	+	1	0	0	.	0	1	2	7	8	␣	␣	g	CR LF
DP	W	T	␣	␣	␣	␣	+	0	.	1	2	7	8	␣	␣	g	CR LF
KF	+	␣	␣	␣	0	.	1	2	7	8	␣	g	␣	␣	CR	LF
MT	S	␣	␣	␣	␣	␣	0	.	1	2	7	8	␣	g	CR	LF
NU	+	0	0	0	0	.	1	2	7	8	CR	LF				

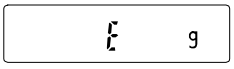
Unstable





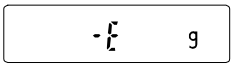
A&D	U	S	,	-	0	1	8	.	3	6	9	0	␣	␣	g	CR LF
	U	S	,	-	1	0	1	.	8	3	6	9	0	␣	␣	g	CR LF
DP	U	S	␣	␣	␣	-	1	8	.	3	6	9	0	␣	␣	g	CR LF
KF	-	␣	␣	1	8	.	3	6	9	0	␣	␣	␣	␣	CR	LF
MT	S	D	␣	␣	-	1	8	.	3	6	9	0	␣	g	CR	LF
NU	-	0	0	1	8	.	3	6	9	0	CR	LF				

Overload
Positive error



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	9	CR	LF					

Overload
Negative error



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	9	CR	LF					

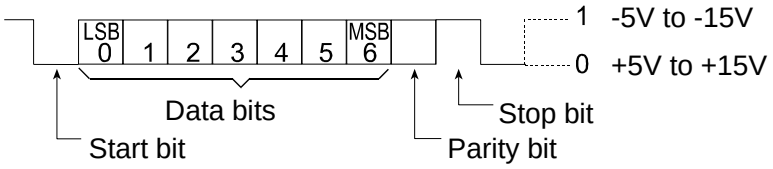
␣	Space,	ASCII	20h
CR	Carriage Return,	ASCII	0Dh
LF	Line Feed,	ASCII	0Ah

8. STANDARD INPUT AND OUTPUT INTERFACE

8.1. RS-232C Interface

The AD-4212D is a DCE device. Connect the AD-4212D to a personal computer (DTE) using a straight through cable.

Transmission system : EIA RS-232C
Transmission form : Asynchronous, bi-directional, half duplex
Transmission rate : 10 times/second or 5 times/second (same as data refresh rate)
Data format : Baud rate : 600, 1200, 2400, 4800, 9600, 19200bps
Data bits : 7 or 8 bits
Parity : Even, Odd (Data bits 7 bits)
None (Data bits 8 bits)
Stop bit : 1 bit
Code : ASCII
Format for one character

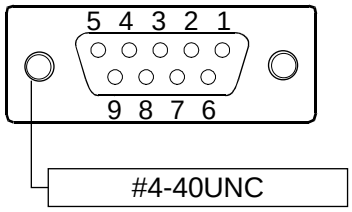


Pin assignments

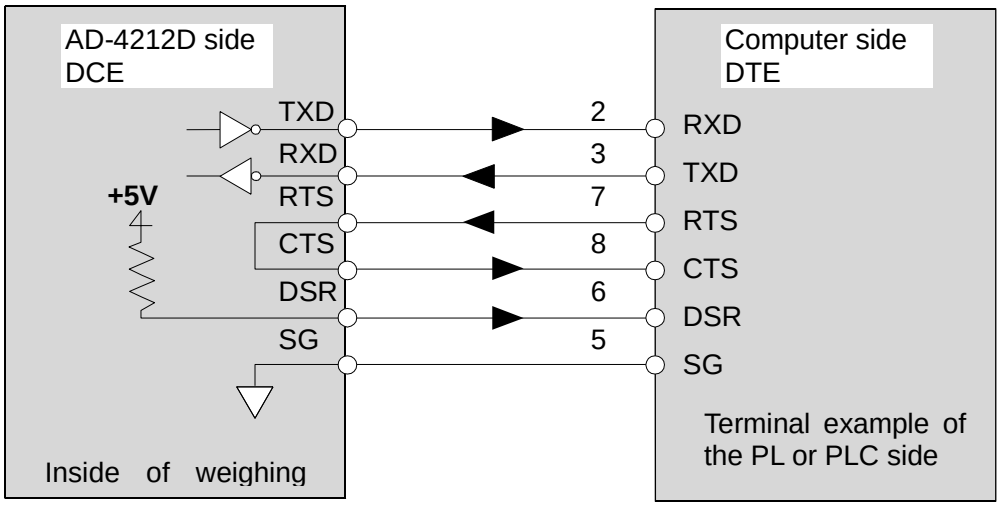
Pin assignments of the RS-232C communication cable for PC or PLC (D-Sub 9 pin side)

Pin No.	Signal name	Direction	Description
1	–	–	No connection
2	TXD	Output	Transmit data
3	RXD	Input	Receive data
4	–	–	No connection
5	SG	–	Signal ground
6	DSR	Output	Data set ready
7	RTS	Input	Request to send
8	CTS	Output	Clear to send
9	–	–	No connection

D-Sub 9 pin plug of RS-232C cable for the PC or PLC



Signal names other than TXD and RXD are DTE-side names.



Connection to a computer using the RS-232C Interface

Features

The AD-4212D is of the DCE type (Data Communication Equipment), which can be connected to a personal computer using the RS-232C interface. Before connection, read the personal computer manual thoroughly.

Using Windows Communication Tools Software (WinCT)

When Windows is used as an operating system in a personal computer, the WinCT software can be used to transmit the weighing data to the personal computer.
The WinCT software has three communication methods: "RsCom", "RsKey" and "Rsweight". Refer to the WinCT instruction manual.
The current version of the WinCT can be downloaded from the A&D website.

RsCom

- RsCom can transmit commands to control the AD-4212D.
- RsCom can make bi-directional communication between the AD-4212D and a personal computer using the RS-232C interface.
- RsCom can display or store the data using a text file format. RsCom can also print the data using a printer connected to the personal computer.
- When several ports of a personal computer have AD-4212D connected, the personal computer can communicate with each AD-4212D simultaneously.
- RsCom can share a personal computer with other application software.

RsKey

- RsKey can transmit the weighing data output from the AD-4212D directly to other application software such as Microsoft Excel.
- RsKey can be used with most application software.

RsWeight

- Can retrieve the weight data from the AD-4212D and display the data as a graph in real time.
  Can calculate and display the maximum, minimum, average, standard deviation and coefficient of variation.

Using the WinCT software, the AD-4212D can do the following:

- **Analyzing the weighing data and the statistics input by "RsKey"**
  The weighing data can be input directly into an Excel worksheet. Then, Excel can analyze the data to obtain total, average, standard deviation, maximum and minimum value, and display them in a graph.
- **Controlling the AD-4212D using commands from a personal computer**
  By using "RsCom", the personal computer sends commands such as "re-zero" or "send weighing data" to the AD-4212D and controls the AD-4212D.
- **Receiving weighing data at a certain interval**
  The weighing data can be received at a certain interval and data characteristic with elapsed time can be obtained.
- **Using a personal computer as an external indicator**
  With the "RsKey" test mode function, a personal computer can be used as an external display for the AD-4212D. (To do this, set the AD-4212D data output mode to stream mode.)

8.2. Commands

Command List

Note A command has a terminator added, that is specified using "SIF, CrLF" of the function table, and is sent to the AD-4212D.

Commands to query weighing data	
C	Cancels the S or SIR command.
Q	Requests the weighing data immediately.
S	Requests the weighing data when stabilized.
SI	Requests the weighing data immediately.
SIR	Requests the weighing data continuously.

Commands to control the AD-4212D	
CAL	Performs sensitivity adjustment using the internal weight.
EXC	Performs sensitivity adjustment using the external weight.
OFF	Goes into standby mode. (Weighing value output is not performed)
ON	Goes into weighing mode from standby mode.
P	Switches between weighing mode and standby mode.
PRT	Confirms operations at the sensitivity adjustment etc.
R	Performs re-zero. #1
RNG	Switches the readability.
TR	Tares the AD-4212D. #1
U	Changes the weighing speed.(Response speed)

Commands to request data	
?ID	Outputs the identification number.
?PT	Outputs the tare value. #1
?SN	Outputs the serial number of the AD-4212D
?TN	Outputs the model name of the AD-4212D.
?TM	Outputs time.
?DT	Outputs date.
?CS	Outputs a correction value for the internal weight.

Command to set data	
PT:***.**** ␣␣ g	Sets the tare value. #1
TM:**:**:**	Sets time. Example) 12:34:56 TM: 12:34:56
DT:**/**/**	Sets date. Example) October 1, 2015 DT: 15/10/01
ID:********	Sets the ID number.
CS:***.**** ␣␣ g	Performs a correction for the internal weight.

#1 □ Command R assumes the point as zero and sets the display to zero.

□ Command TR cancels the tare weight when the displayed value is greater than zero. The canceled tare value can be read using the command ?PT.

- Command PT:***.**** ␣␣ g sets the tare value digitally.
  An example of this command sets a negative target value and fills with the sample until the display becomes zero. For details, refer to page 41.
  Step 1 Place a container.
  Step 2 Set the display to zero using the R command.
  Step 3 Set a target value using the PT: command.

Acknowledge Code And Error Codes

When the "Serial interface function (SIF)" parameter is set to "ErCd on", the AD-4212D outputs <AK> code or error code to each command as follows:

<AK> (06h) Acknowledge in ASCII code.

□ When the AD-4212D receives a command to request data and can not process it, the AD-4212D transmits an error code (EC, Exx).
When the AD-4212D receives a command to request data and can process it, the AD-4212D outputs the data.

□ When the AD-4212D receives a command to control the AD-4212D and can not process it, the AD-4212D transmits an error code (EC, Exx).
When the AD-4212D receives a command to control the AD-4212D and can process it, the AD-4212D transmits the acknowledge code.

<AK> (06h) Acknowledge in ASCII code.

Among commands to control the AD-4212D, the following transmit the acknowledge code both when the AD-4212D receives the command and when the AD-4212D has accomplished the command. If the command can not be processed properly, the AD-4212D transmits an error code (EC, Exx). This error can be released using the CAL command. xx is error code number.

CAL command	(Sensitivity adjustment command using internal weight)
EXC command	
ON command	(Display ON command)
P command	(Display ON/OFF command)
R command	(RE-ZERO command)
TR command	(Tare command)

□ When a communication error has occurred due to external noise, or a parity error has occurred due to transmission error, the AD-4212D transmits an error code (EC, Exx). In this case, send the command again. xx is error code number.

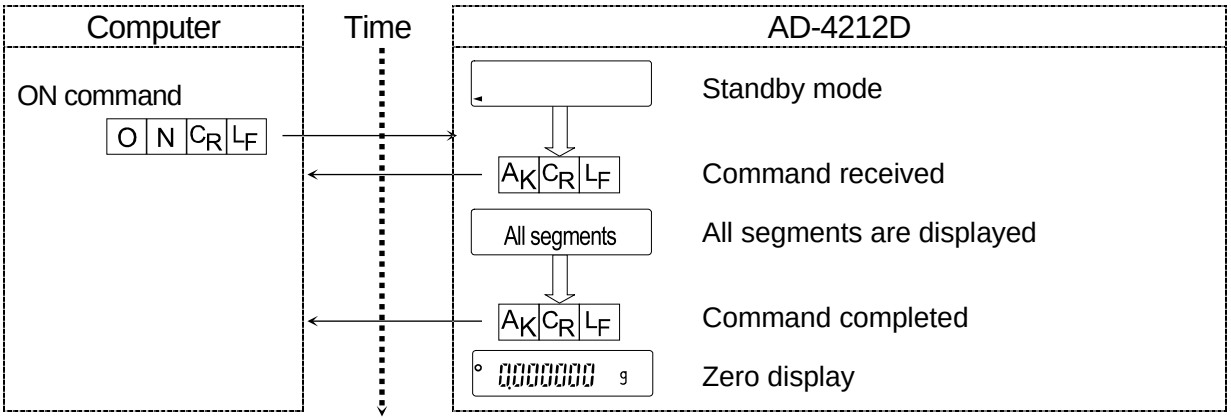
Settings Related To RS-232C

Concerning the RS-232C, the AD-4212D has two functions: "Data output (dout)" and "Serial interface (SIF)". Set each function as necessary.

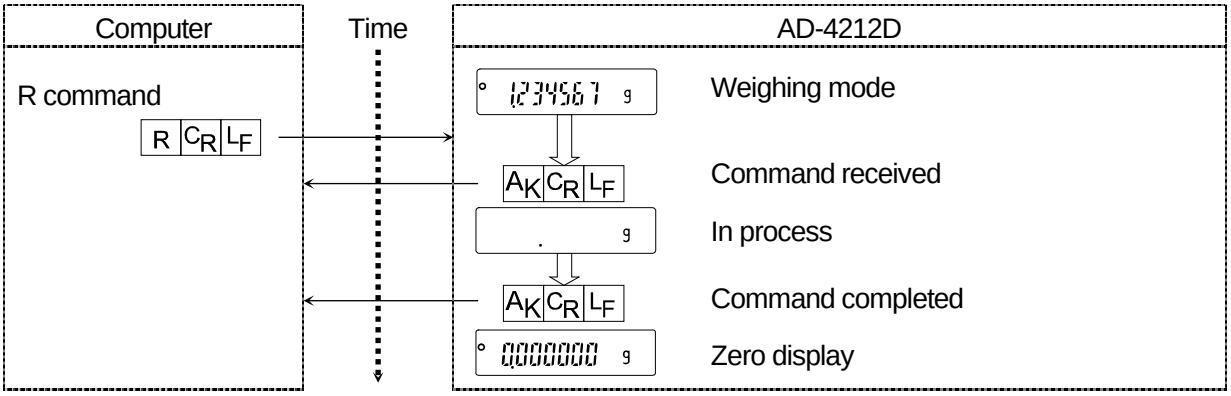
Command Examples

This example uses the "ErCd on" of "SiF" so that the <AK> (06h) code is output.

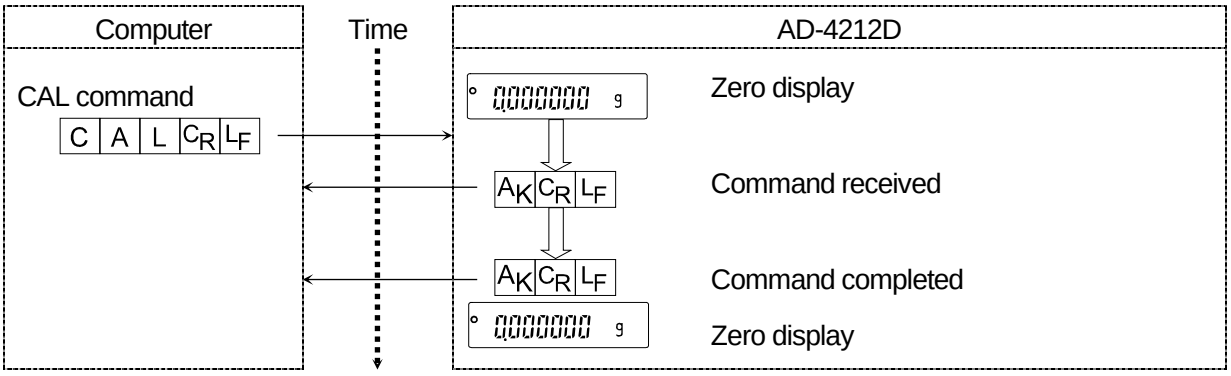
ON command (turning on the AD-4212D)



R command (Re-zeroing the display)

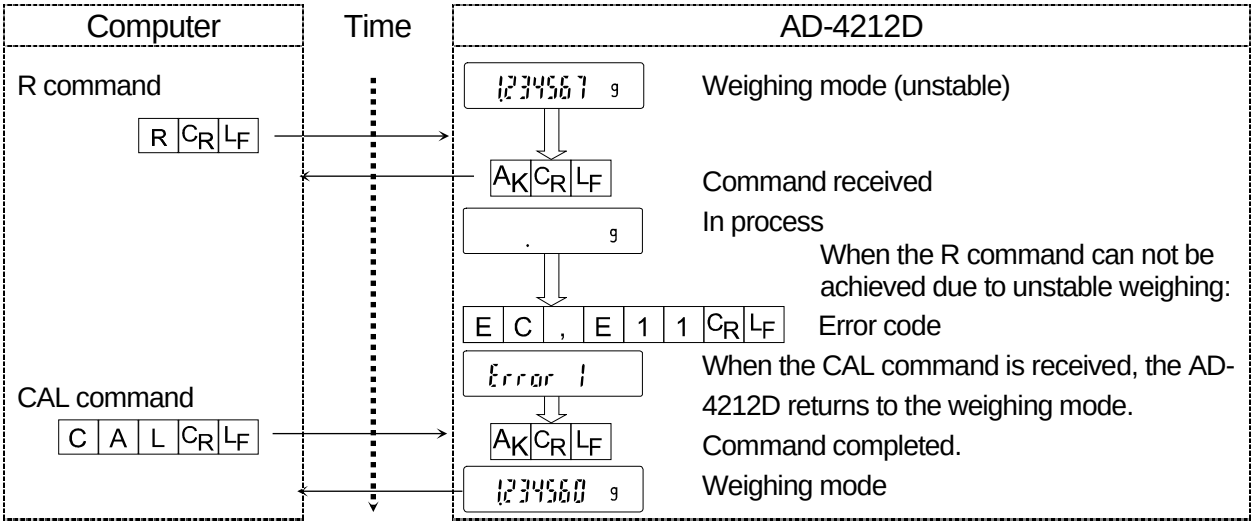


CAL command (Sensitivity adjustment with internal weight)



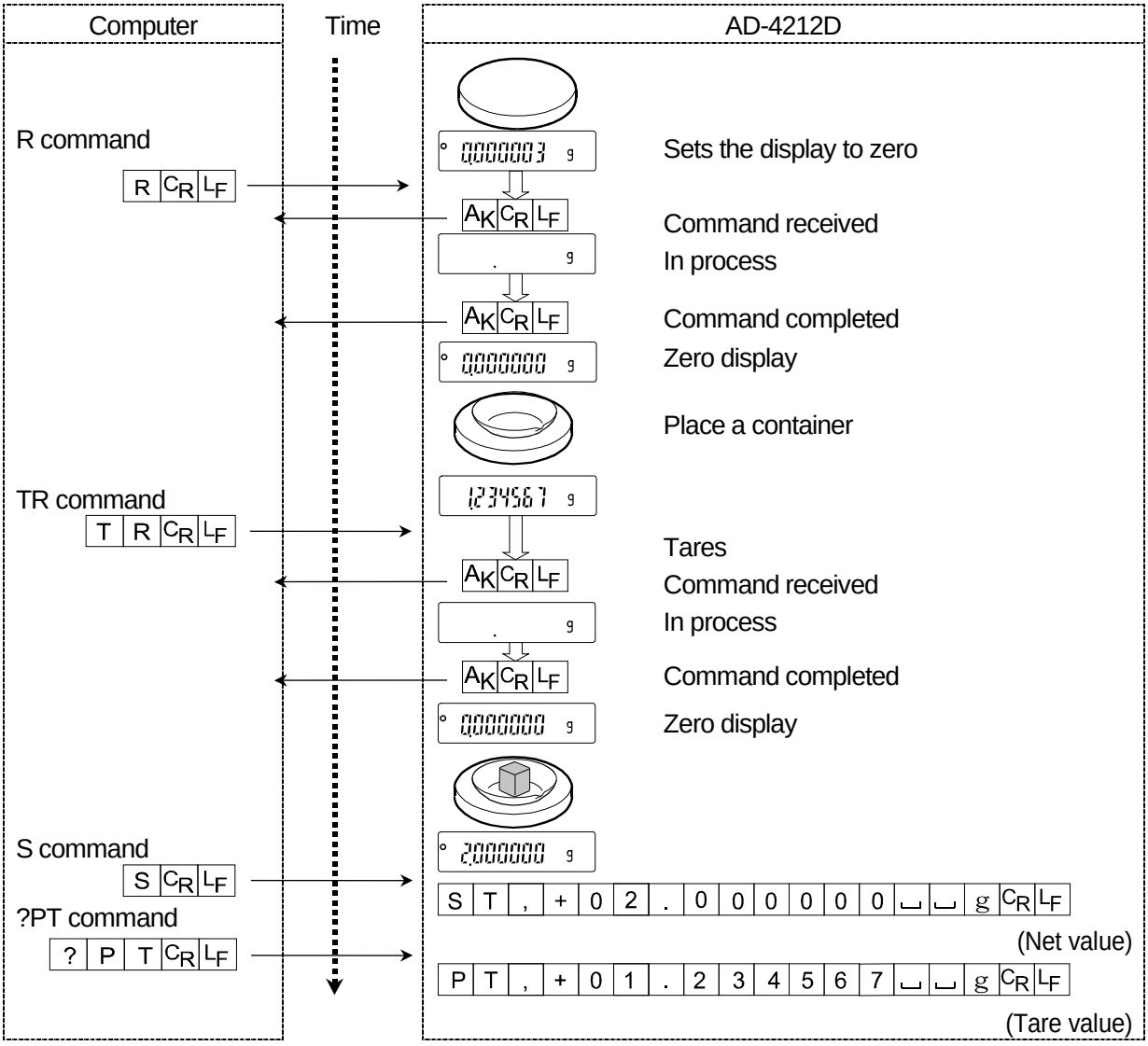
Error code

This example is of an error using the R command. "ErCd on" is used. The AD-4212D transmits an error code when the received command can not be achieved.



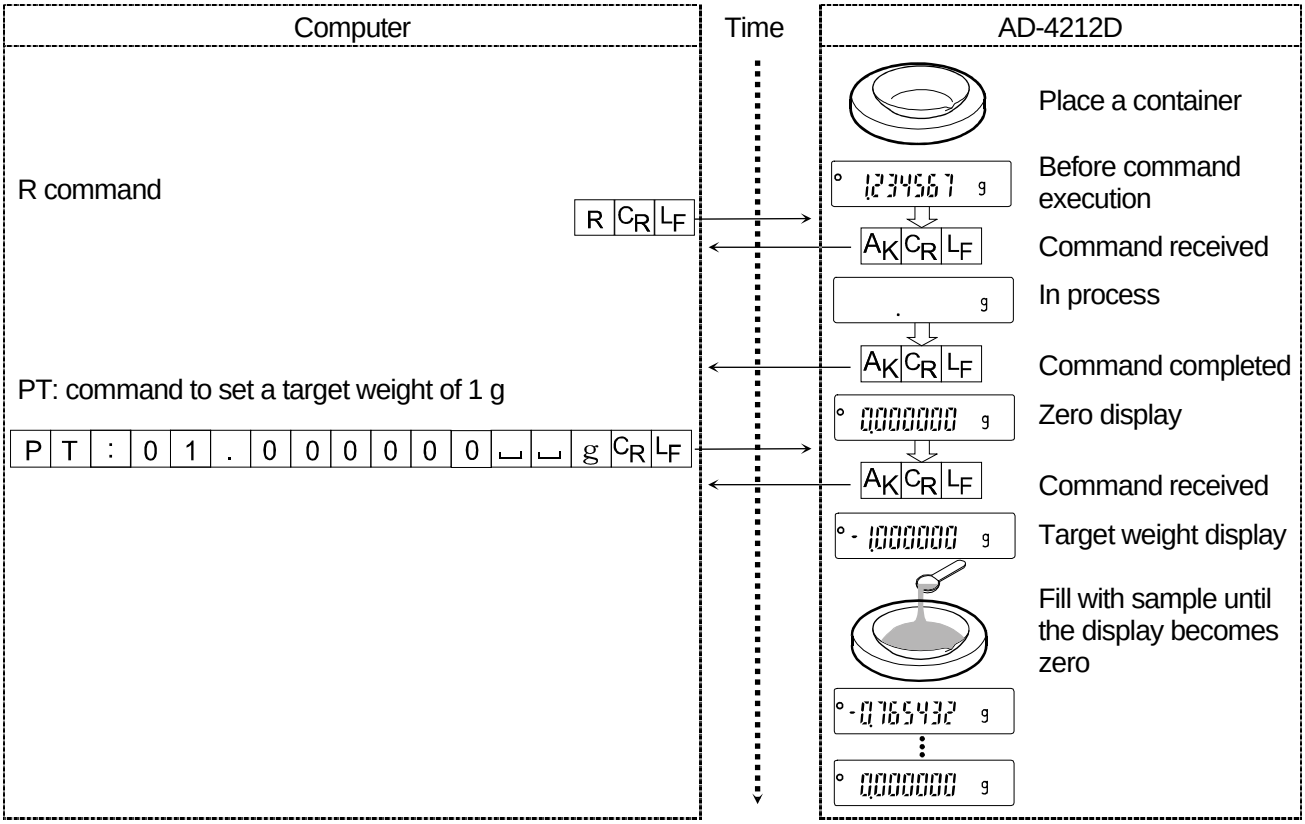
Weighing with a tare

This example uses "ErCd on" of "S iF" so that the <AK> (06h) code is output.



Setting a negative target value and filling with a sample until the display becomes zero

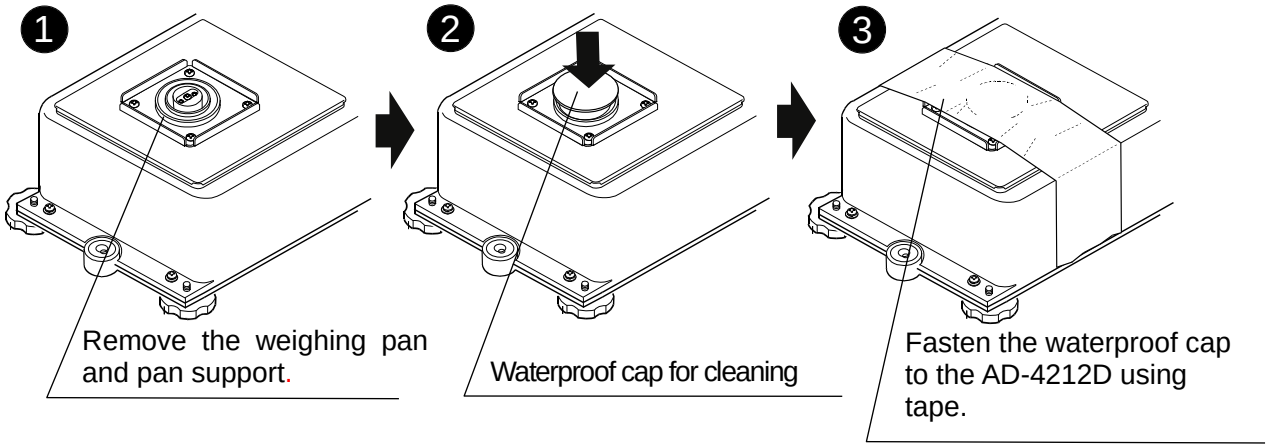
This example uses "ErCd on" of "SiF" so that the <AK> (06h) code is output.



9. MAINTENANCE

9.1. Treatment Of The AD-4212D

- When cleaning, remove the weighing pan and pan support from the AD-4212D and attach the waterproof cap for cleaning the AD-4212D.
- Do not use organic solvents to clean the AD-4212D.
- Do not disassemble the AD-4212D. Contact the local A&D dealer if the AD-4212D needs service or repair.
- Use the original packing material for transportation. When packing, fasten the waterproof cap to the AD-4212D using the tape by following the instructions at the figure below.
- Consider " **2. UNPACKING THE AD-4212D**" and "**3. PRECAUTIONS**" when operation the AD-4212D.



9.2. Error Codes

Error code	Description
EC,E00	**Internal error** If displaying this error continuously, contact your local A&D dealer to repair the AD-4212D.
EC,E11	**Stability error** The AD-4212D can not stabilize due to an environmental problem. Check around the pan. Prevent vibration, drafts, temperature changes, static electricity and magnetic fields, from influencing the AD-4212D. Press the CAL key to return to the weighing mode.
EC,E16	**Internal weight error** Applying the internal weight does not yield a change in the weighing value as specified. Confirm that there is nothing on the pan and perform the weighing operation from the beginning again.
EC,E17	**Internal weight error** The internal weight application mechanism does not function properly. Perform the weighing operation from the beginning again.
EC,E20	**External weight error** The external weight is too heavy. Confirm the weighing value. Press the CAL key to return to the weighing mode.

Error code	Description
EC,E21	**External weight error** The external weight is too light. Check around the pan. Confirm the weighing value. Press the CAL key to return to the weighing mode.
E	**Overload error** A sample beyond the AD-4212D weighing capacity has been placed on the pan. Remove the sample from the pan.
−E	**Underload error** The weighing value is too light. Confirm that the weighing pan and pan support are properly installed. Press the ON:OFF key two times to return to the weighing mode. If the error still persists, adjust the sensitivity of the AD-4212D.
EC,E00	**Communications error** A protocol error occurred in communications. Confirm the format, baud rate and parity.
EC,E01	**Undefined command error** An undefined command was received. Confirm the command.
EC,E02	**Not ready** A received command can not be processed. Example: □ The AD-4212D received a "Q" command, but not in the weighing mode. □ The AD-4212D received a "Q" command while processing a RE-ZERO command. Adjust the delay time to transmit a command.
EC,E03	**Timeout error** If the timeout parameter is set to "t-UP on", the AD-4212D did not receive the next character of a command within the time limit of one second. Confirm the communication.
EC,E04	**Excess characters error** The AD-4212D received excessive characters in a command. Confirm the command.
EC,E06	**Format error** A command includes incorrect data. Example: □ The data is numerically incorrect. Confirm the command.
EC,E07	**Parameter setting error** The received data exceeds the range that the AD-4212D can accept. Confirm the parameter range of the command.
Other error code	If an error described above can not be released or other errors are displayed, contact the local A&D dealer.

9.3. Checking The AD-4212D Performance And Environment

The AD-4212D is a precision instrument. When the operating environment or the operating method is inadequate, correct weighing can not be performed. Place a sample on the pan and remove it, and repeat this several times. If the AD-4212D seems to have a problem with repeatability or to perform improperly, check as described below. If improper performance persists after checking, contact the local A&D dealer for repair.

Checking that the operating environment or weighing method is proper

Operating environment

- □ Is the weighing table solid enough?
- □ Is the AD-4212D level?
- □ Is the operating environment free from vibration and drafts?
- □ Is there a strong electrical or magnetic noise source such as a motor near the AD-4212D?

Weighing method

- □ Does the weighing pan rim touch anything? Is the weighing pan installed correctly?
- □ Is the RE-ZERO button touched before placing a sample on the weighing pan?
- □ Is the sample placed in the center of the weighing pan?
- □ Has the AD-4212D been adjusted the sensitivity using the internal weight (one-touch sensitivity adjustment)?
- □ Has the AD-4212D been warmed up for one hour before weighing? (At the AD-4212D-33/32, duration of four hours or more are required.)

Sample and container

- □ Has the sample absorbed or lost moisture due to the ambient conditions such as temperature and humidity?
- □ Has the temperature of the container been allowed to equalize to the ambient temperature?
- □ Is the sample charged with static electricity?
- □ Is the sample of magnetic material such as iron? There are cautions about weighing magnetic materials.

Checking that the AD-4212D performs properly

- □ Check the AD-4212D performance using an external weight. Be sure to place the weight in the center of the weighing pan.
- □ Check the AD-4212D repeatability, linearity and sensitivity using external weights with a known value.
- □ Check whether the sensitivity adjustment is performed correctly. If an error occurs and the sensitivity adjustment can not be performed quickly, the AD-4212D may not measure correctly.

9.4. Asking For Repair

If the AD-4212D needs service or repair, contact your local A&D dealer.

The AD-4212D is a precision instrument. Use much care when handling the AD-4212D and observe the following when transporting the AD-4212D.

- □ Use the original packing material for transportation.
- □ Remove the weighing pan, pan support, rings and dust plate from the main unit.

10. SPECIFICATIONS

	AD-4212D-33	AD-4212D-32	AD-4212D-302	AD-4212D-301
Weighing capacity	32 g	32 g 5.1 g	320 g	320 g
Maximum display	32.000084 g	32.00008 g 5.100009 g *1	320.00084 g	320.0084 g
Readability	0.001 mg	0.01 mg 0.001 mg	0.01 mg	0.1 mg
Repeatability (Standard deviation)	0.002 mg *2	0.02 mg 0.004 mg *2	0.02 mg *3	0.07 mg *3
Linearity	±0.02 mg	±0.03 mg	±0.15 mg	±0.25 mg
Stabilization time (Typical at FAST)	Approx. 7 seconds	Approx. 7 seconds	Approx. 7 seconds	Approx. 3 seconds
Sensitivity drift	±2 ppm/°C (10 °C to 30 °C)			
Operating environment	5 °C to 40 °C, 85 %RH or less (No condensation)			
Display refresh rate	5 times/second or 10 times/second			
Environmental sensors	Resolution: Temperature ±1.5 °C, Humidity ±10 %, Air pressure ±10 hPa Applicable range: 5 °C to 40 °C			
Display mode	Gram, milligram			
Communication function	RS-232C			
External weights for sensitivity adjustment	30 g 20 g 10 g 5 g 2 g 1 g	30 g 20 g 10 g 5 g 2 g 1 g	300 g 200 g 100 g 50 g 20 g 10 g	300 g 200 g 100 g 50 g
Size of loading area for weighing	Weighing pan: ϕ 34 mm		Weighing pan: ϕ 50 mm	
External dimensions	167.5(W) x 298(D) x 90(H) mm			
Power supply & AC adapter type	Power consumption: Approx. 30VA (supplied to the AC adapter) Confirm that the adapter type is correct for the local voltage and power receptacle type.			
Current consumption	DC12V Approx. 0.3A (Excluding the AC adapter and options)			
Mass	Approx. 3.6kg			

- The operating environment does not include excessive change of ambient temperature, humidity, vibration, drafts, magnetic fields and static electricity.
- The internal weight may change due to corrosion or other damage caused by the operating environment, or due to aging. Check the internal weight periodically and correct the internal weighing value if necessary.

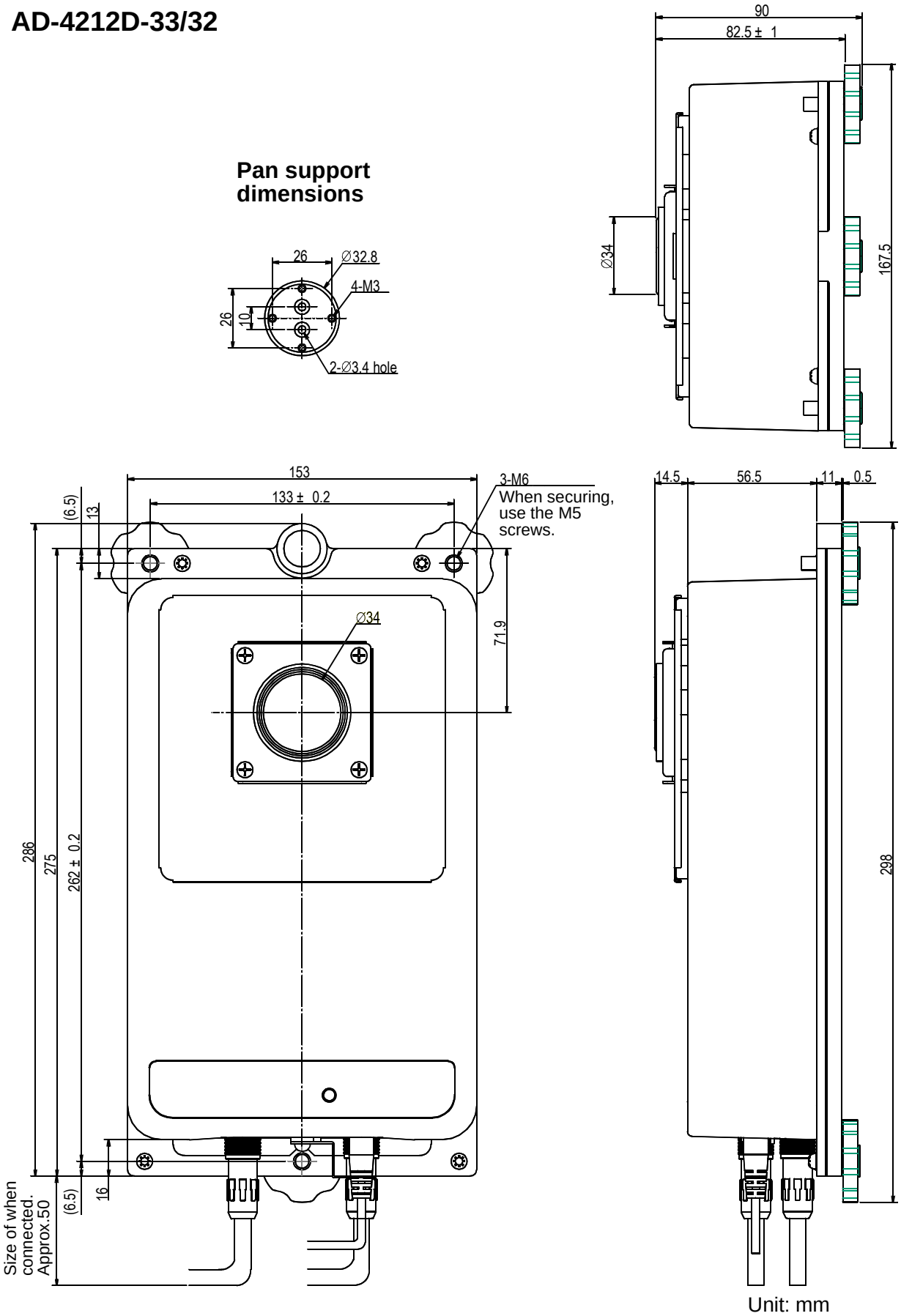
*1 When placing the tare weight within the standard range, if using the smart range, the weighing sample can be weighed within the precision range.

*2 This is a figure measured by loading and unloading a 1g weight on the device using the automatic machine.

*3 The repeatability for 10 gram within the weighing capacity.

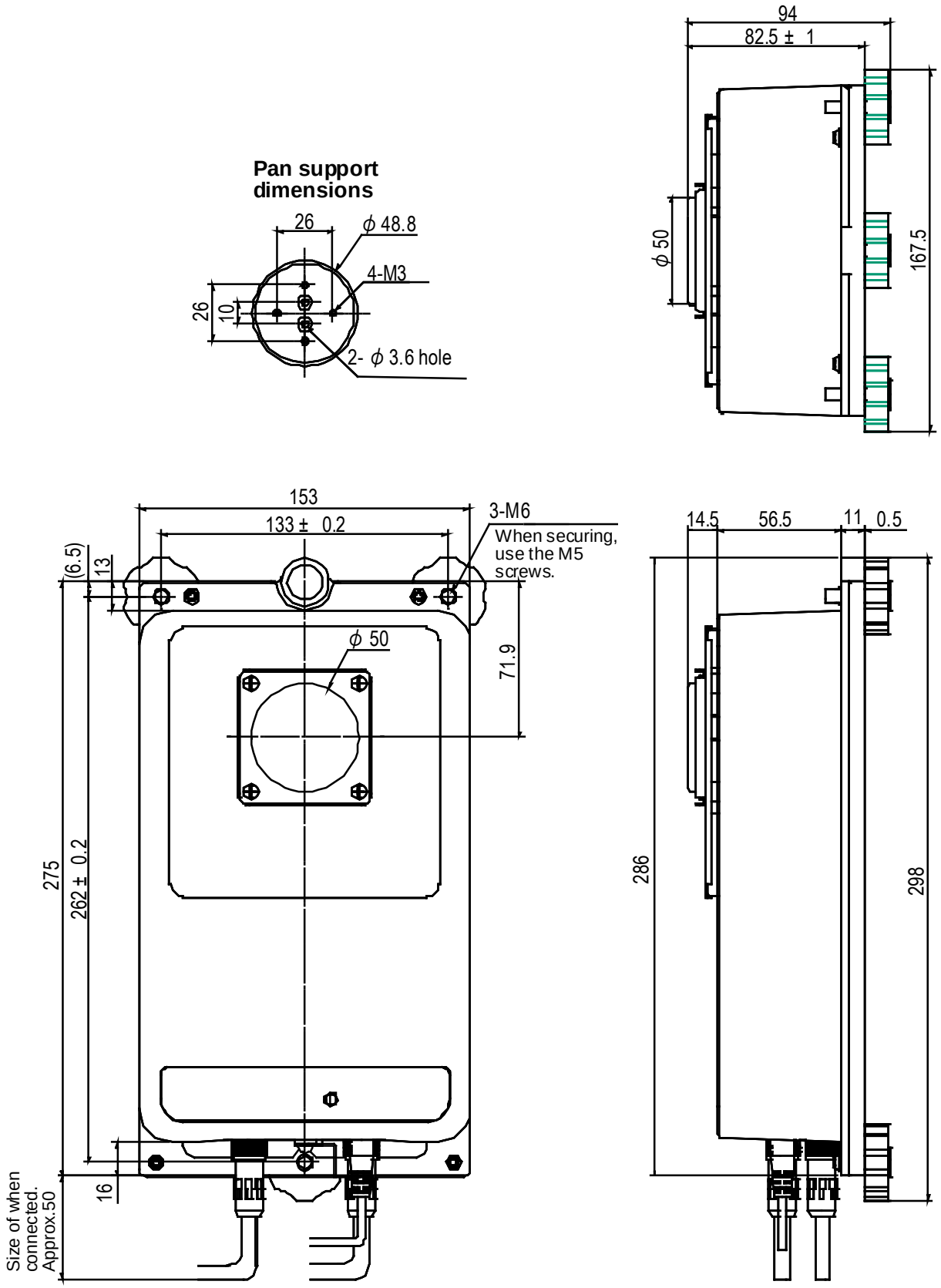
11. EXTERNAL DIMENSIONS

AD-4212D-33/32



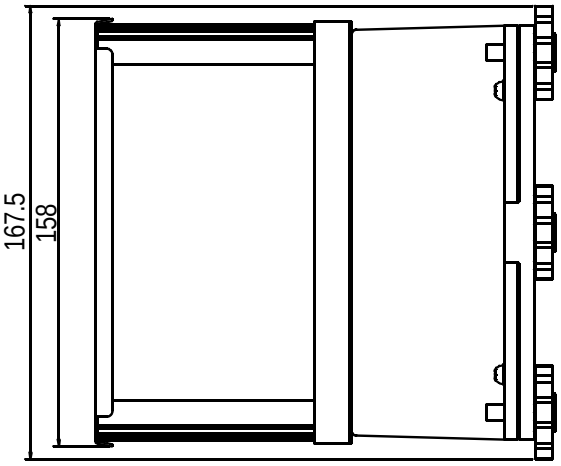
Unit: mm

AD-4212D-302/301

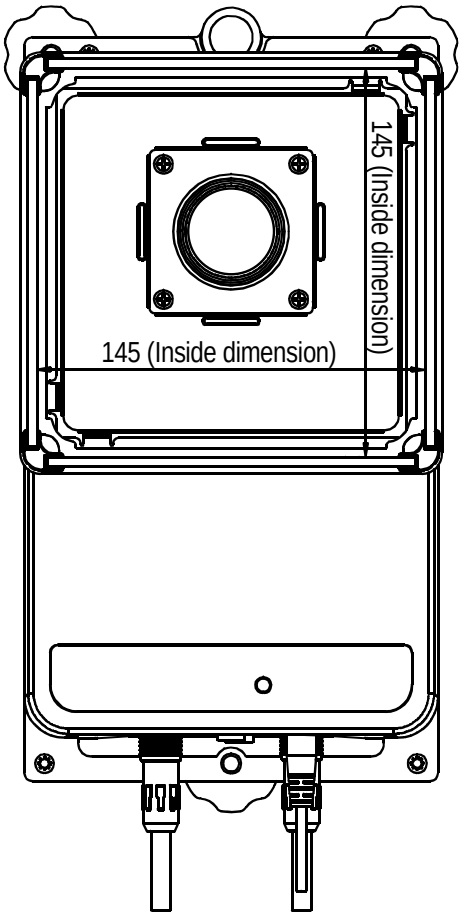


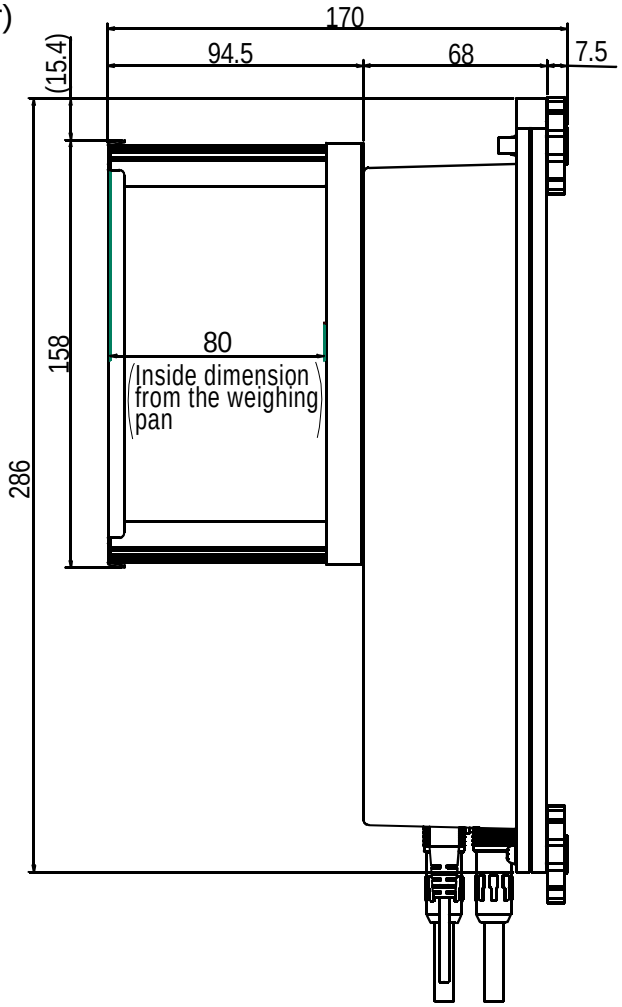
Unit: mm

When attaching the small breeze break on the AD-4212D series



Inside dimensions of the small breeze break
(When removing the breeze break cover)





Unit: mm

12. PERIPHERALS

AX-KO7796-1000 (For external display) RS-232C cable 10m

AX-KO4472-1000 (For PC, PLC) RS-232C cable 10m

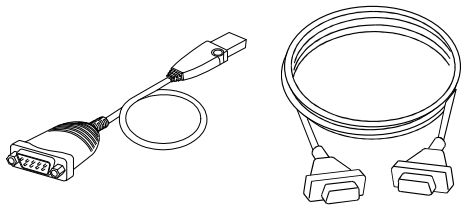
AX-KO4472-150 (For PC, PLC) RS-232C cable 1.5m

AX-KO3705-500 RS-232C output cable for AD-8922A-01, 5 m

AX-USB-9P: USB converter/Cable set

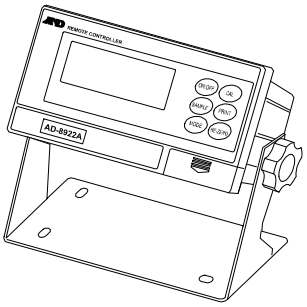
- USB converter (D-Sub 9 pin - USB)
- RS-232C cable (D-Sub 9 pin - D-Sub 9-pin)

***** This RS-232C cable is not used with the AD-4212D series.



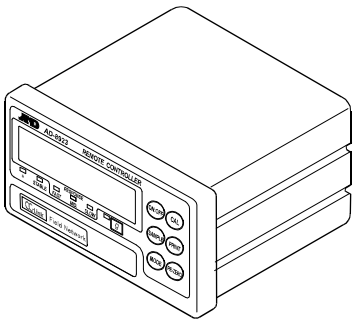
AD-8922A: Remote controller

- The AD-8922A can receive the weighing data, and performs re-zero and sensitivity adjustment manually.
- The AD-8922A can output the data using BCD (AD-8922A-01), comparator (AD-8922A-04), or analog out (AD-8922A-06), by selection of the option installed in the AD-8922A.



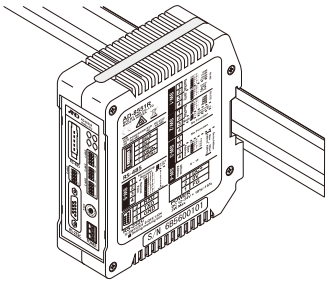
AD-8923-BCD/CC: Remote controller

- The AD-8923-BCD or AD-8923-CC can receive the weighing data, and performs re-zero and sensitivity adjustment manually.
- The AD-8923-BCD can output the data using BCD.
  The AD-8923-CC can output the data using CC-Link.



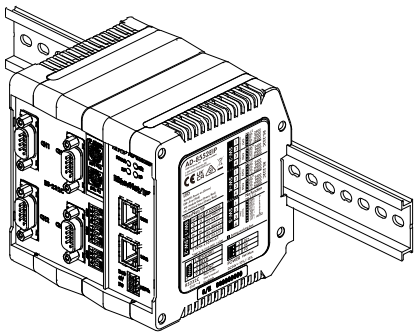
AD-8551R Modbus RTU converter

- RS-232C output from the AD-4212D can be converted to Modbus RTU.



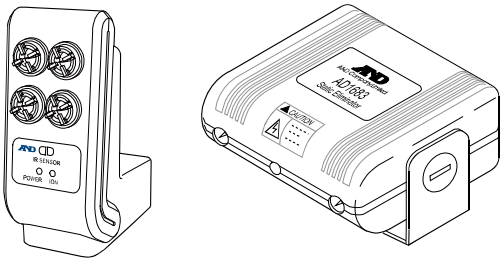
AD-8552EIP EtherNet/IP converter

- RS-232C output from the AD-4212D can be converted to EtherNet/IP.



AD-1683 /AD-1683A: DC static eliminator

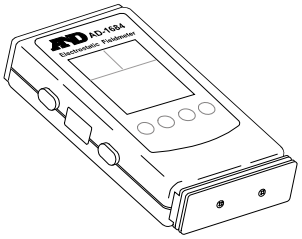
- Statistic eliminator that prevents error which can be caused when weighing samples are electrically charged.
- It's direct-current system and plentiful ion content enable weighing without breeze, which is ideally suited for preciously measuring powder and such.



- The built-in IR Sensor enables removal of static electricity in a touchless way.(AD-1683A only)

AD-1684A: Electrostatic field meter

- This option measures the amount of the static charge on the sample, tare or peripheral equipment and displays the result.
  If those are found to be charged, discharge them using an ionizer such as AD-1683A.



13. TERMS

Terms

Stable value The weighing value when the stabilization indicator appears.

Environment Ambient conditions such as vibration, drafts, temperature, static electricity or magnetic fields which affect the weighing operation

Sensitivity Adjustment Adjustment of the AD-4212D using the sensitivity adjustment weight so that it can weigh accurately.

Output To output the weighing data using the RS-232C interface.

Span value A value where the zero point is subtracted from the weighing value when placing the sample on the weighing pan.

Zero point A weighing reference point or the zero display. Usually refers to the value displayed when nothing is on the weighing pan.

Digit Unit of minimum display. Used for the AD-4212D, the minimum displayable weighing value.

Tare To cancel the weight of a container which is not included in the weighing data.

Re-zero To set the display to zero.

GLP Good Laboratory Practice.

Repeatability Variation in measured values obtained when the same weight is placed and removed repetitively. Usually expressed as a standard deviation.
e.g. Standard deviation=1 digit: This means that the measured values fall within ±1 digit at a probability of about 68%.

Stabilization time Time required after a sample being placed, until the stabilization indicator illuminates and the weighing data is displayed.

Sensitivity drift An affect that a change in temperature causes to the weighing data. Expressed as temperature coefficient.
e.g. Temperature coefficient = 2 ppm/°C : If a load is 100 g and the temperature changes by 10°C, the value displayed changes by the following value.
0.0002%/°C x 10°C x 100 g = 2 mg

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