

INSTRUCTION MANUAL

EDX-12A

Compact Recording System

VOLTAGE MEASURING UNIT

Thank you for purchasing KYOWA's product EDX-12 Voltage Measuring Unit.

Read this Instruction Manual carefully in order to make full use of the high performance capabilities of the product.

Do not use the product in methods other than described in this Manual.

This Manual only describes hardware operation of the EDX-12A. For the Dynamic Data Recording Software DCS-100A, see the DCS-100A Instruction Manual (For EDX-10A Operation).

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STANDARD ACCESSORIES

The following accessories are packed with the EDX-12A.
When unpacking, check the contents to ensure that all accessories are enclosed.

Input Adapter UI-51A:		1
Rubber Foot:		8/sheet
Screws (cross recessed head):		2
Term and Conditions of		1
Product Warranty:		

OPTIONAL ACCESSORIES

Input cable:		U-125
Quick-fitting input adapter:		UI-52A

SAFETY PRECAUTIONS (Do not forget to read the safety precautions prior to use.)

The EDX-12A is designed to be used according to "7. SPECIFICATIONS."

Do not use the EDX-12A in an environment exceeding the specifications.

Or, system failure may result in.

PRIOR TO USE

For safe use of the EDX-12A, do not forget to read the "Safety Precautions" prior to use.

Kyowa Electronic Instruments Co., Ltd. assumes no liability for any damage resulting from the user's failure to comply with the safety precautions.

For safety operation of the EDX-12A, the following symbol mark is attached to the EDX-12A.

	Indicates "PROTECTIVE GROUND TERMINAL." Be sure to connect the GND terminal to the ground.
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SAFETY SYMBOLS

For safety operation of the EDX-12A, the following symbol marks are used in the Instruction Manual.

 WARNING	Improper operation of the system may result in death or severe injury of the operator.
 CAUTION	Improper operation of the system may result in injury of the operator and physical damage of the system.

 WARNING
• WARNING Be sure to observe the warning and precautions described in the EDX-10A Instruction Manual (FOR HARDWARE) and EDX-12A Instruction Manual. • Avoid using in environment with inflammable gas, etc. To prevent the risk of fire hazard or explosion, do not use the EDX-12A in environment with inflammable gas, vapor, or dust. • If any trouble occurs To prevent fire hazards, if smoke is emerging from the EDX-12A, immediately disconnect the USB cable or AC adapter to terminate the system operation. • Compatible input The EDX-12A is a measuring instrument for voltage. Be sure to input voltage only. Failure to do so will pose the risk of electric shock, deteriorated performance and system failure.

CAUTION

- CAUTION

Be sure to observe the caution and precautions described in the EDX-10A Instruction Manual (FOR HARDWARE) and EDX-12A Instruction Manual.

- Do not use the EDX-12A outdoors.

Or, it may cause electric shock, fire hazard, lower the performance and cause trouble.

- Use the EDX-12A within temperature ranging from 0 to 40°C.

Use at temperatures exceeding the specified range may lower the performance and cause trouble.

If use under direct sunlight or in a cold place is inevitable, prepare a sunscreen or take proper measures to keep it warm.

- Use the EDX-12A in the specified operating humidity of 20 to 85%.

Use in a humid place exceeding the specified range or where it is exposed to splashing water may lower the performance and cause trouble.

- Do not use the EDX-12A immediately after the change in the environment.

Leave the EDX-12A as it is to acclimate to the environment.

Abrupt change in ambient temperature due to transportation, etc. may cause dew condensation, which may result in lower performance and troubles.

- Do not use the EDX-12A where it is subject to significant vibration or impact.

The vibration resistance and impact resistance are as follows.

Vibration resistance: 29.42m/s² (3G), 5 to 200Hz (when operating)

Impact Resistance: 196.1m/s²(20G)/11msec

Use the EDX-12A in an area where vibration and impact can be kept within the scope of specifications.

Continuous vibration or severe impact may cause deteriorated performance and system failure.

- Do not use the EDX-12A in strong electromagnetic field.

Use the EDX-12A in an environment where magnetic field is acceptable to the PC.

Performance may be lowered and erroneous operation and troubles may result if it is used near a telemetry system, microwave oven, electronic furnace or any other equipment generating a strong magnetic field.

- Do not pull cables.

Lay cords and cables with a certain allowance so that unreasonable force is applied to the connections.

Failure to do so will pose the risk of erroneous data, disconnection and connector failure.

- Avoid installing sensors and EDX-12A near a welding machine. Failure to do so will pose the risk of erroneous data, malfunction and failure.

- Do not disassemble or remodel the EDX-12A.

Disassembling or remodeling by user may cause electric shock hazards or damage the EDX-12A.

This warranty does not cover any damaged or defective parts that results from disassembling or remodeling.

- Do not use the EDX-12A under dusty environment.

This can lead to performance problems and decreased operating efficiency.

Be careful that dust may not enter the EDX-12A not only during operation but also under stored conditions.

- Preheat the EDX-12A before use.

After the power ON, always preheat the EDX-12A for approximately 10 minutes.

- Do not apply any voltage beyond the specified input voltage range.

Failure to do so will pose the risk of deteriorated performance and system failure.



CAUTION

- Do not apply any voltage beyond the specified input voltage range (-50V to +50V).
Failure to do so will pose the risk of deteriorated performance and system failure.
See the following precautions before measuring.
 - 1) Use a tester or the like to measure the voltage between negative sides of the DC voltage and confirm that the voltage is approximately 0 V.
 - 2) Confirm that the voltage between the negative side of the DC voltage and the GND terminal of the EDX-10A is approximately 0 V.
 - 3) When connecting an input, correctly connect the positive and negative sides.
Or, internal circuits have short-circuited and cause troubles.
 - 4) You cannot measure the middle voltage of the battery connected with the sensors.
Or, internal circuits have short-circuited and cause troubles.Failure to comply with the above precautions will result in a short circuit of the signal source (e.g. DC power supply) of the measuring target, thus causing system failure and a fire hazard.

LIMITED LIFE PARTS AND PREVENTIVE MAINTENANCE

The EDX-12A consists of various electronic components and those components, if not all, have a useful life.

Using them exceeding the years specified according to each part type (useful life) may affect the characteristics of the EDX-12A, resulting in a malfunction or a failure.

You need to replace parts with a regular preventive maintenance schedule.

Limited life parts used with the EDX-12A are as follows.

○ Aluminum electrolytic capacitor

The signal-noise ratio will lower due to capacity low or smoke will be emitted due to liquid leak, resulting in a malfunction of the EDX-12A.

○ AC adapter (optional accessories)

Heat and smoke will be emitted, resulting in an unstable voltage.

To operate the EDX-12A normally, finding a sign of the EDX-12A failure early by daily/periodic inspections and taking the corrective action are required.

For inspection, contact KYOWA or our representatives.

* All components do age and will fail.

EDX-12A REPLACEMENT BEFORE THE END OF SERVICE LIFE

Preventive maintenance and replacement parts are a cost-effective way of keeping the performance and extending the service life of the EDX-12A.

Regardless of the replacement parts, the EDX-12A itself gradually deteriorates with age.

Before the expected service life is reached, consider replacing the EDX-12A with a new one or the latest series as preventive maintenance.

NOTATIONS USED IN THE INSTRUCTION MANUAL

Informational Notes

Certain notations are used as necessary to attract your attention to information that requires special care when handling the EDX-12A, and to information provided for reference purposes.

Examples of Notations

NOTE

Essential precautions required when handling the EDX-12A.

MEMO

Reference items required when handling the EDX-12A.

IMPORTANT PRECAUTIONS WHEN USING EDX-12A

NOTE

1. Be sure to use the accessory screws (binding head screw, $M3 \times 5$) for coupling measuring units.
Longer screws will damage the inner PCB components.
2. After the power ON, always preheat the EDX-12A for approximately 10 minutes.

CE MARKING

NOTE

1. Be sure to use the input cable for the EDX-12A. Wrap the ferrite core two turns around every channel cable.

Recommended ferrite core	Model: E04SR170730A
	Seiwa Electric Mfg. Co.,Ltd.
2. Be sure to use the input cable (U-125) for the EDX-12A.
3. The input cable length (U-125) must be less than 30 m.

APPEARANCE OF PRODUCT

- Some products have a weld line often looks like a scratch or a line on the product appearance. It is called a “weld line” which occurred during parts molding. Weld lines are not a crack or scratch. There are no problems with the quality, performance and strength of the product.

1. OUTLINE OF THE PRODUCT

1-1. OUTLINE OF THE PRODUCT

The EDX-12A is a measuring unit for voltage. The EDX-12A has to be installed in the EDX-10A.

One EDX-12A is capable of measurement of 4 channels and maximum 16 channels with 4 EDX-12A units.

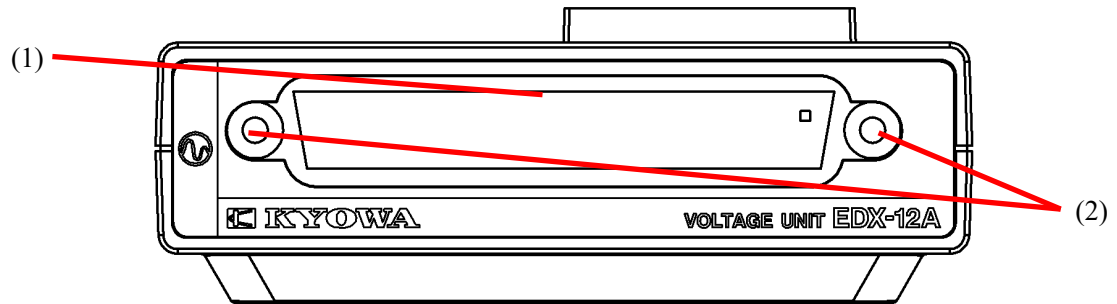
When connecting one EDX-12A, the EDX-10A offers additional convenience for measurements because they are powered from the USB interface and do not require a separate power supply.

1-2. FEATURES

- Compact and lightweight
- Stacking connectors enable easy connection and make synchronous cables unnecessary.
- Since one measuring unit is capable of measurement of 4 channels and maximum 16 channels with 4 measuring units, the EDX-10A is compatible for measurement in a wide range from a simple experiment to advanced measurement.
- When connecting one measuring unit, the EDX-10A offers additional convenience for measurements because they are powered from the USB interface and do not require a separate power supply. When connecting 2 to 4 measuring units, be sure to use the optional AC adapter.
- A/D conversion function (24-bit)
- Capable of measuring maximum 50V.

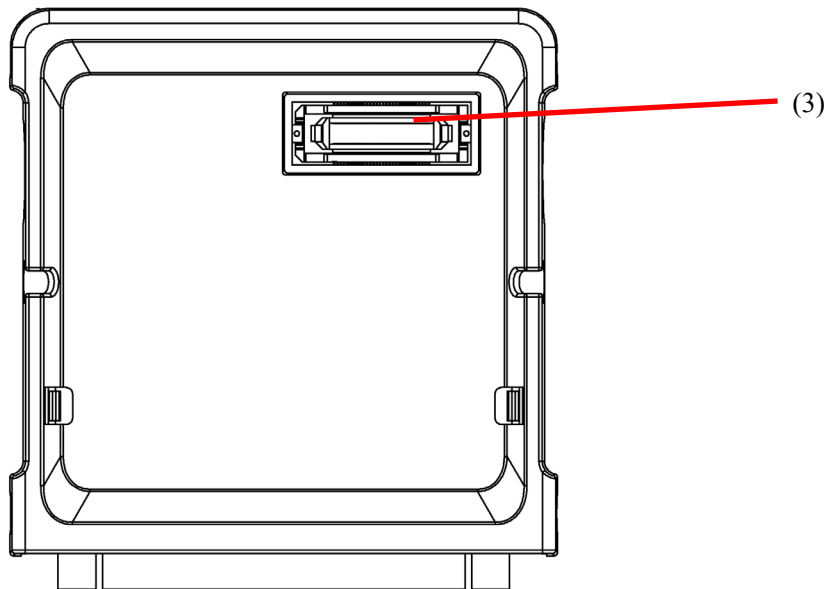
2. CONTROLS AND INDICATORS

2-1. FRONT



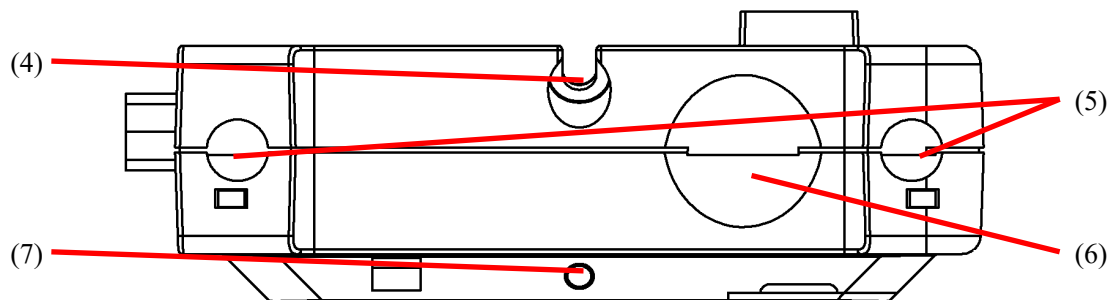
- (1) Input Connector Input connector for 4 channels.
Connect the accessory input adapter (UI-51A) or optional accessory input cable (U-125).
- (2) Fixing metal For fixing the D-sub connector of the input cable (U-125).

2-2. TOP



- (3) Unit-coupling Connector Connector for connecting the EDX-10A or measuring units on the EDX-12A.

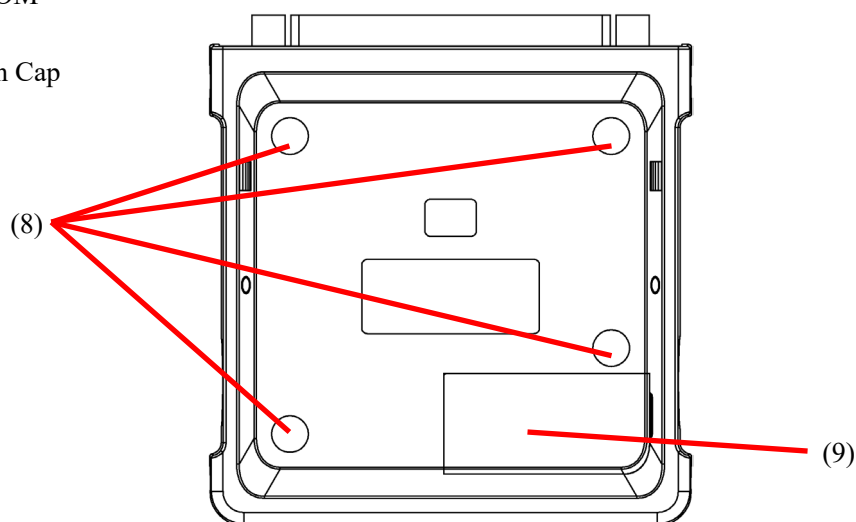
2-3. SIDE



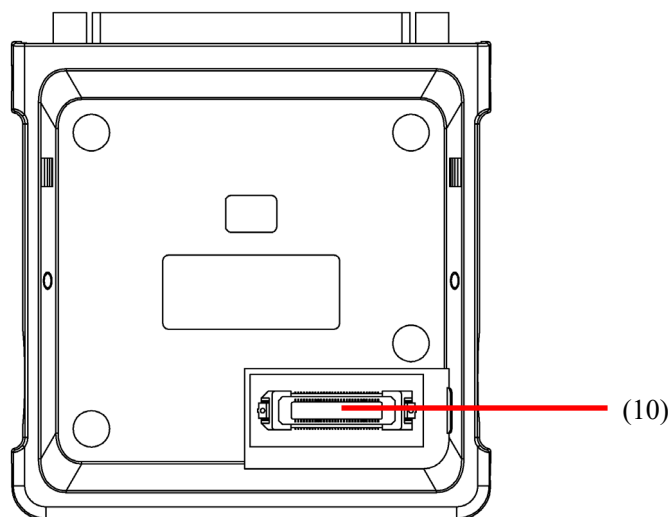
- | | |
|-----------------------|--|
| (4) Clearance hole | For fixing the EDX-10A or measuring unit on the EDX-12A by using a screw. |
| (5) Finger slot | For connecting/disconnecting the EDX-10A and a measuring unit. |
| (6) Rubber foot slot | The EDX-12A has small rubber feet (optional) to keep it from sliding around when placed on a flat surface. |
| (7) Fixing screw hole | For fixing the measuring unit, under the EDX-12A, by using a screw. |

2-4. BOTTOM

With Cap



With no Cap

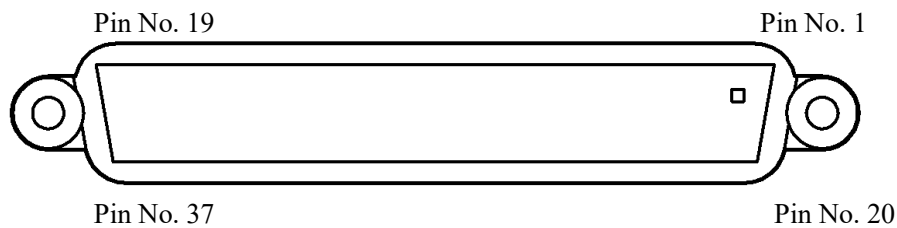


- | | |
|------------------------------|---|
| (8) Rubber foot slot | The EDX-12A has small rubber feet (optional) to keep it from sliding around when placed on a flat surface. |
| (9) Cap | Cap for protecting the unit-coupling connector on the EDX-12A bottom. Remove the cap before connecting measuring units. |
| (10) Unit-coupling Connector | Connector for connecting measuring units under the EDX-12A. |

3. PIN ASSIGNMENT AND CONNECTION OF INPUT CONNECTOR

3-1. PIN ASSIGNMENT OF INPUT CONNECTORS

Pin No.	Signal Name	Function	Pin No.	Signal Name	Function
1	NC		20	CH1 B	CH1 -IN
2	NC		21	CH1 D	CH1 +IN
3	NC		22	NC	
4	NC		23	NC	
5	NC		24	CH2 B	CH2 -IN
6	NC		25	CH2 D	CH2 +IN
7	NC		26	NC	
8	NC		27	NC	
9	NC		28	NC	
10	NC		29	CH3 B	CH3 -IN
11	NC		30	CH3 D	CH3 +IN
12	NC		31	NC	
13	NC		32	NC	
14	NC		33	CH4 B	CH4 -IN
15	NC		34	CH4 D	CH4 +IN
16	NC		35	NC	
17	NC		36	NC	
18	NC		37	NC	
19	NC				



NOTE

- [NC]: Non-connection pin
Do not connect anything.
Or, deterioration of the instrument may result.
- Connect the shield to the D-sub connector case.

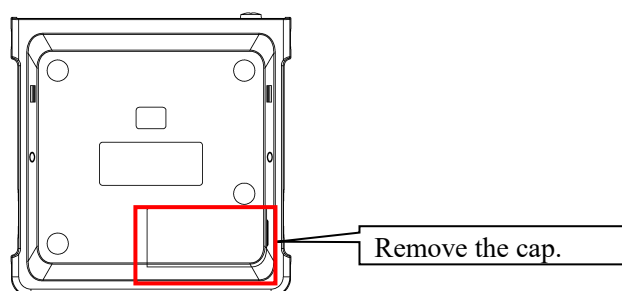
3-2. CONNECT THE MEASURING UNITS

This section describes how to connect the EDX-10A and measuring units into the EDX-12A.

NOTE

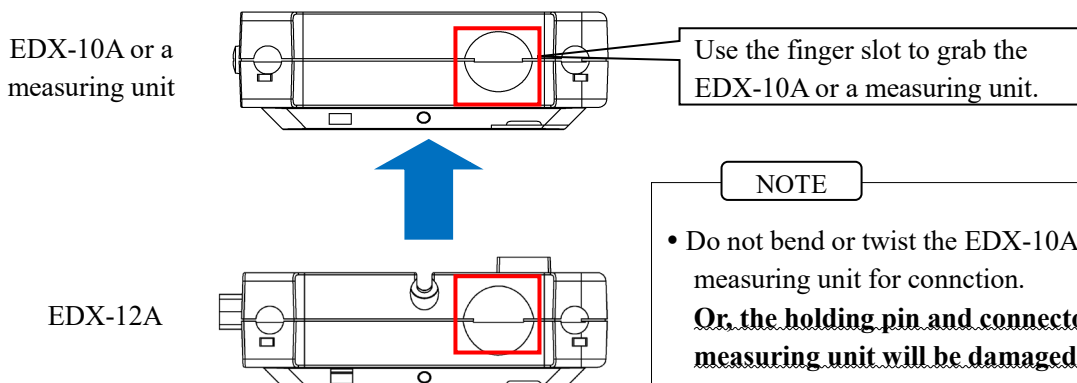
- Mount the cap to the unit-coupling connector of the very-bottom measuring unit.
Or, it may cause system failures and accidents.
- You can connect the measuring units up to 4 units. Do not connect 5 or more measuring units.

- 1) To connect the EDX-10A or a measuring unit on the EDX-12A, remove the cap of the EDX-10A or a measuring unit to be connected.



- 2) Connect the unit-coupling connector on the EDX-10A bottom or on the measuring unit bottom and connector on the EDX-12A top.

Use the finger slots to connect the EDX-10A or measuring unit and EDX-12A.



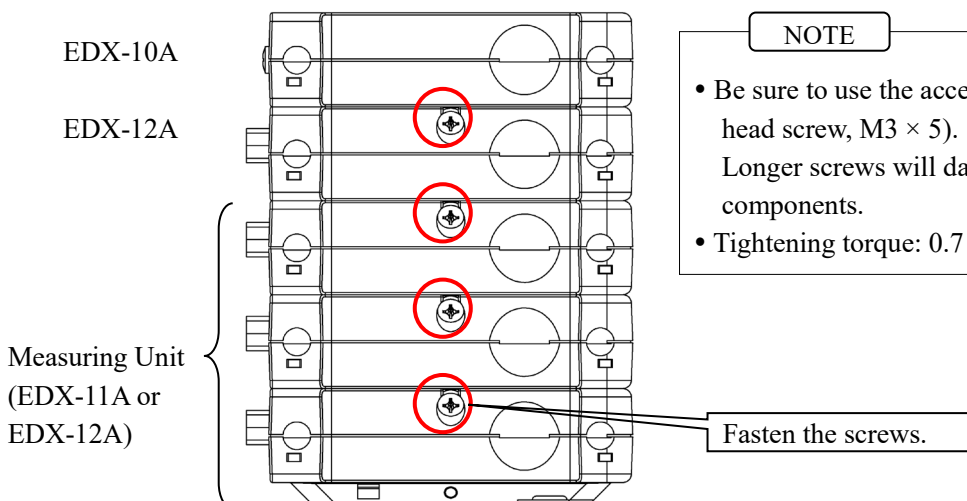
NOTE

- Do not bend or twist the EDX-10A and the measuring unit for connection.
Or, the holding pin and connectors on the measuring unit will be damaged.

- 3) To connect a measuring unit under the EDX-12A, remove the cap of the EDX-12A.

- 4) Connect the unit-coupling connector on the EDX-12A bottom and connector on the measuring unit top.

- 5) Fasten the accessory screws on both sides of the measuring units.



NOTE

- Be sure to use the accessory screws (binding head screw, M3 × 5).
Longer screws will damage the inner PCB components.
- Tightening torque: 0.7 Nm or less

4. CONNECT VOLTAGE

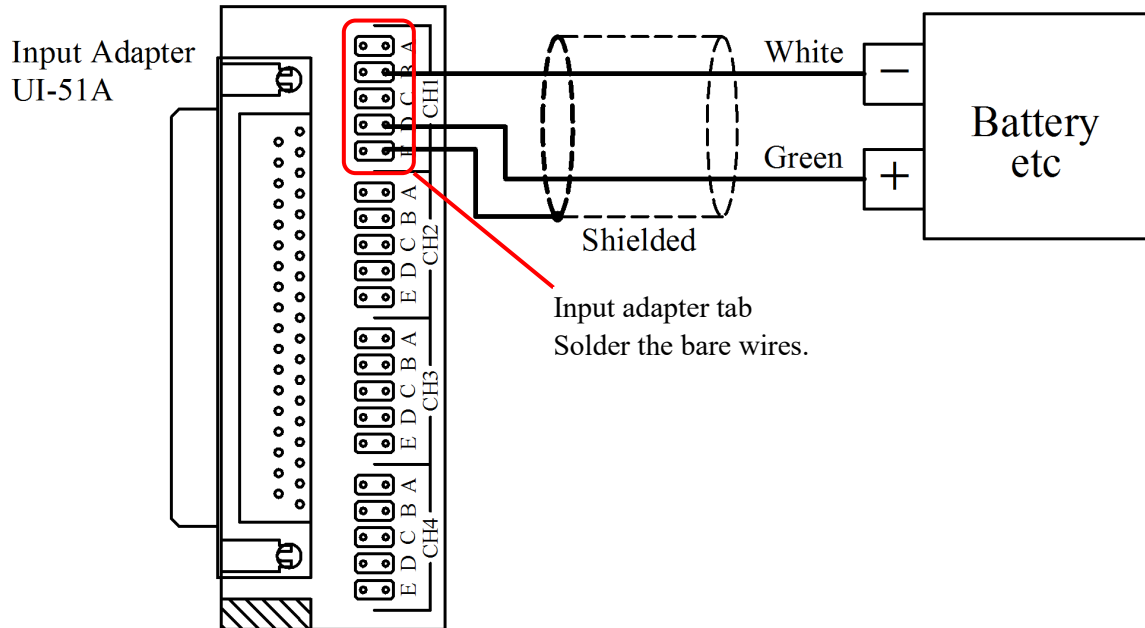
The EDX-12A is a measuring instrument for voltage. The input cable should be connected as follows.

NOTE

Before connecting voltage, disconnect the USB cable and AC adapter from the EDX-10A to turn OFF the power.

4-1. When using the accessory input adapter (UI-51A)

- 1) When the cable, connected to the battery has bare wires, solder the bare wires onto the input adapter tab as follows. Maintain the temperature of the soldering iron tip between 260 to 350°C (within 5 seconds).



MEMO

Before recording data, select the strain mode and monitor the noise.

If excessive noise is measured, ground the shield of the output cable or connect it to the GND terminal of the EDX-10A, whichever results in less noise.

NOTE

- Every CH is not insulated.
- Correctly connect the wiring.
 - Positive (+) input: D terminal
 - Negative (-) input: B terminal
- Special care should be taken when handling soldering irons and solders.
- Tabs can endure several times of soldering with temperature of the soldering iron tip from 260 to 350°C (within 5 seconds). If you disconnect and solder leadwires for several times, patterns on the tab may be damaged. In that case, stop using and purchase a new input adapter (UI-51A).
- Do not place the input adapter on any metal surface. Do not touch the tab directly with hands. Failure to do so will pose the risk of failure, electric shock, and erroneous data.
- When you disconnect the input adapter, do not pull on the cable itself. Failure to do so will pose the risk of disconnection and tab failure.

WARNING

- Do not apply any voltage beyond the specified input voltage range.

The input voltage range of the EDX-12A is $\pm 50\text{V}$.

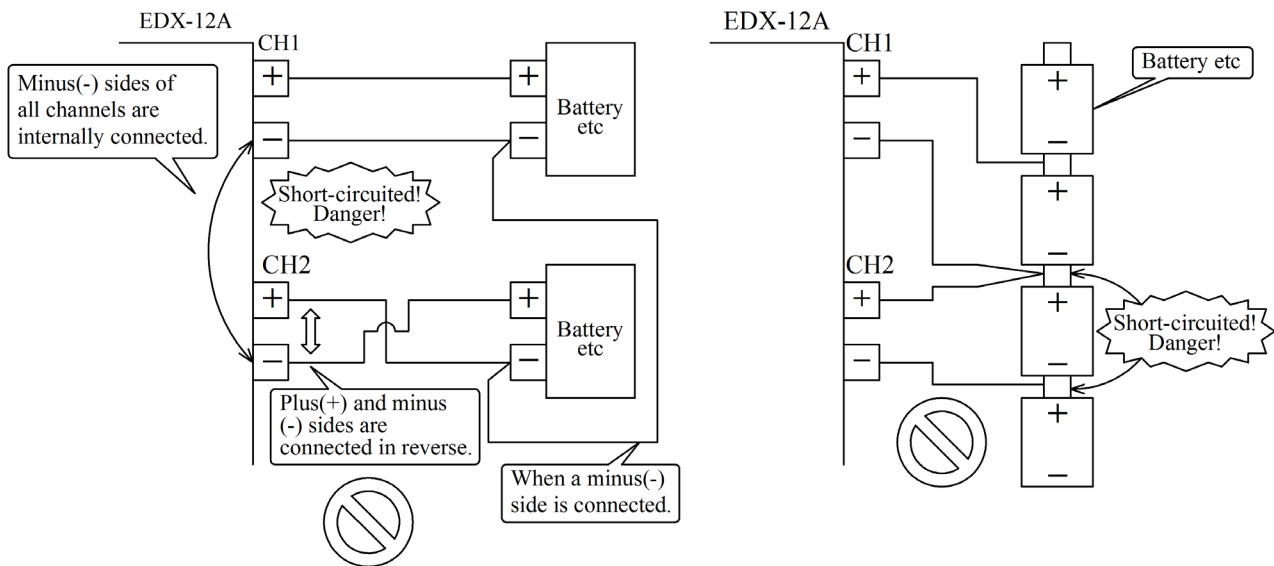
Failure to do so will pose the risk of electric shock, deteriorated performance and system failure.

- Precautions when measuring the DC voltage of a battery, power supply, etc.

See the following precautions when measuring the DC voltage of a battery, power supply, etc.

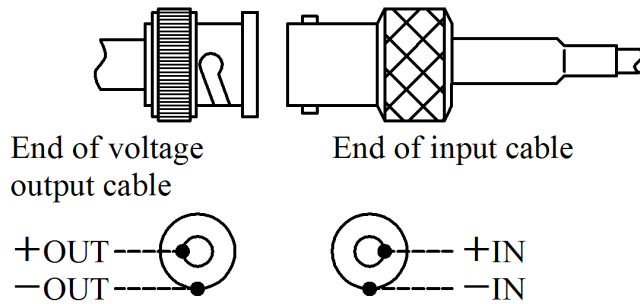
- 1) Use a tester or the like to measure the voltage between negative sides of the DC voltage and confirm that the voltage is approximately 0 V.
- 2) Confirm that the voltage between the negative side of the DC voltage and the GND terminal of the EDX-10A is approximately 0 V.
- 3) When connecting an input, correctly connect the positive and negative sides.
Or, internal circuits have short-circuited and cause troubles.
- 4) You cannot measure the middle voltage of the battery connected with the sensors.
Or, internal circuits have short-circuited and cause troubles.

Failure to comply with the above precautions will result in a short circuit of the signal source (e.g. DC power supply) of the measuring target, thus causing system failure and a fire hazard.

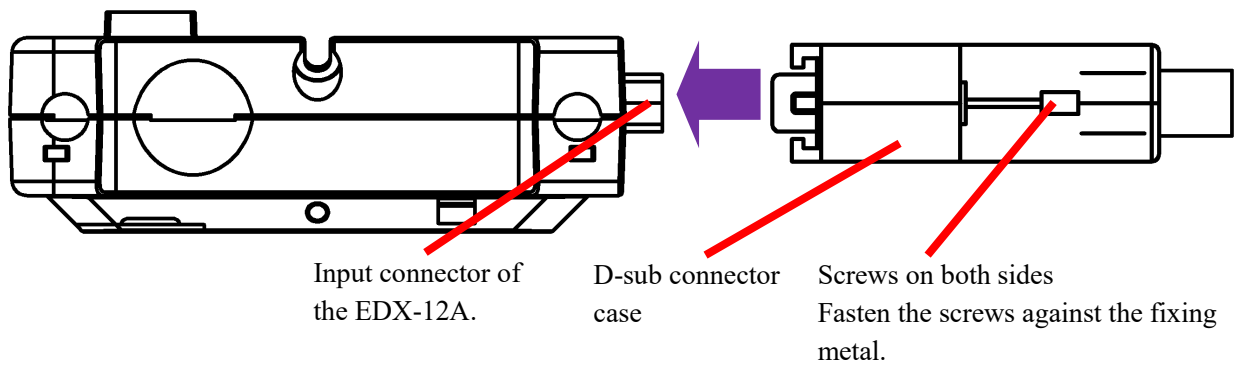


4-2. When using the optional accessory input cable (U-125)

- 1) Connect the BNC connector to the D-sub connector of the input cable (U-125).



- 2) Insert the D-sub connector case into the input connector of the EDX-12A.
- 3) Fasten the D-sub connector case tightly with the two screws.
- 4) To disconnect, unfasten the two screws on the D-sub connector case. Hold the D-sub connector case and pull it.



MEMO

Before recording data, select the voltage mode and monitor the noise.

If excessive noise is measured, ground the shield of the output cable or connect it to the GND terminal of the EDX-10A, whichever results in less noise.

NOTE

- When you disconnect the input cable, do not pull on the cable itself.
Failure to do so will pose the risk of disconnection and connector failure.
- Do not fasten the screws on the D-sub connector case too tightly. Or, the screws will be damaged.

5. TROUBLE SHOOTING

When the EDX-12A does not operate as expected or when it operates unstably, trace the cause before concluding a defect of EDX-12A.

Items to be checked and countermeasure against various phenomena are described in the following table.

If troubles are not solved despite countermeasures, contact KYOWA or our representative.

If the EDX-12A is damaged due to disassembling or remodeling by the user, KYOWA may refuse the repair.

Trouble	Checked Items and Countermeasures
The balancing operation cannot be conducted.	• The "Balance" is [OFF] or [NONE] on the channel condition setting window. Set the "Balance" [ON]. If OK still does not appear, a sensor is not connected, a sensor is failure, or sensor input is unstable. • The input exceeds the half of the input range of the measuring unit. • The input has excessive noise. For details, see the following "Noisy" part.
Unstable zero point	• The zero point will drift when the EDX-12A is not sufficiently preheated. Always preheat the EDX-12A for approximately 10 minutes. • The "no load output" of the sensor is unstable. Repair the cable or replace the sensor with a new one. If troubles are not solved despite countermeasures, contact KYOWA or our representative.
Noisy	• Be sure to connect the GND terminal to the ground. • Do not locate the input cable near the inverter motor, machine tool, welding machine, or AC motor power supply. Separately locate the input cable from the power source. For details, see the following MEMO. • Set the low-pass filter to reduce noise. Set the cutoff frequency of the low-pass filter twice as large as the input signal frequency. Example Suppose the input is DC to 20 Hz. Set the cutoff frequency 100 Hz. If the input signal rapidly changes, set 2k Hz.

MEMO

Inductive interference

Using the EDX-12A, near equipment generating strong magnetic field, generates induction noise. The equipment includes large motors, transformer, and ferro-resonant constant voltage transformer. Locating the EDX-12A, far away from measuring points, also generates induction noise. Take the following measures to protect against induction noise.

- Separately locate the EDX-12A from the power source.
- Use a shielded cable for sensor connection. Connect the shield to the E terminal of the input cable (U-125).

Potential interference

Potential interference occurs when the target to be measured has a DC/AC potential.

At this time, grounding the EDX-12A is not necessarily a good thing. It may be appropriate to connect the target to be measured and EDX-10A.

If there is induction noise or if the target to be measured has potential, it is rare to be solved by a simple method.

Especially nowadays, the number of electrical devices that are used together in the measuring environment are increasing resulting to affect with each other as the noise cause. The above mentioned countermeasures are mere examples. Fully consider the operational environment and take appropriate measures to obtain the most preferable results.

6 MAINTENANCE

For the EDX-12A, the following items should be serviced for scheduled maintenance. Maintenance service should be performed at the intervals specified below.

Table 6-1 Calibration of apparatus

Item	Content	Service intervals
Evaluation of accuracy of measuring units	An annual maintenance inspection (including a calibration and adjustment) is recommended to ensure the accuracy of measuring units. Must be returned to KYOWA for the scheduled maintenance inspection.	Once in a year

Particularly if the EDX-12A is used continuously for long periods of time, early replacement of parts is required for the purposes of safety and stable operation.

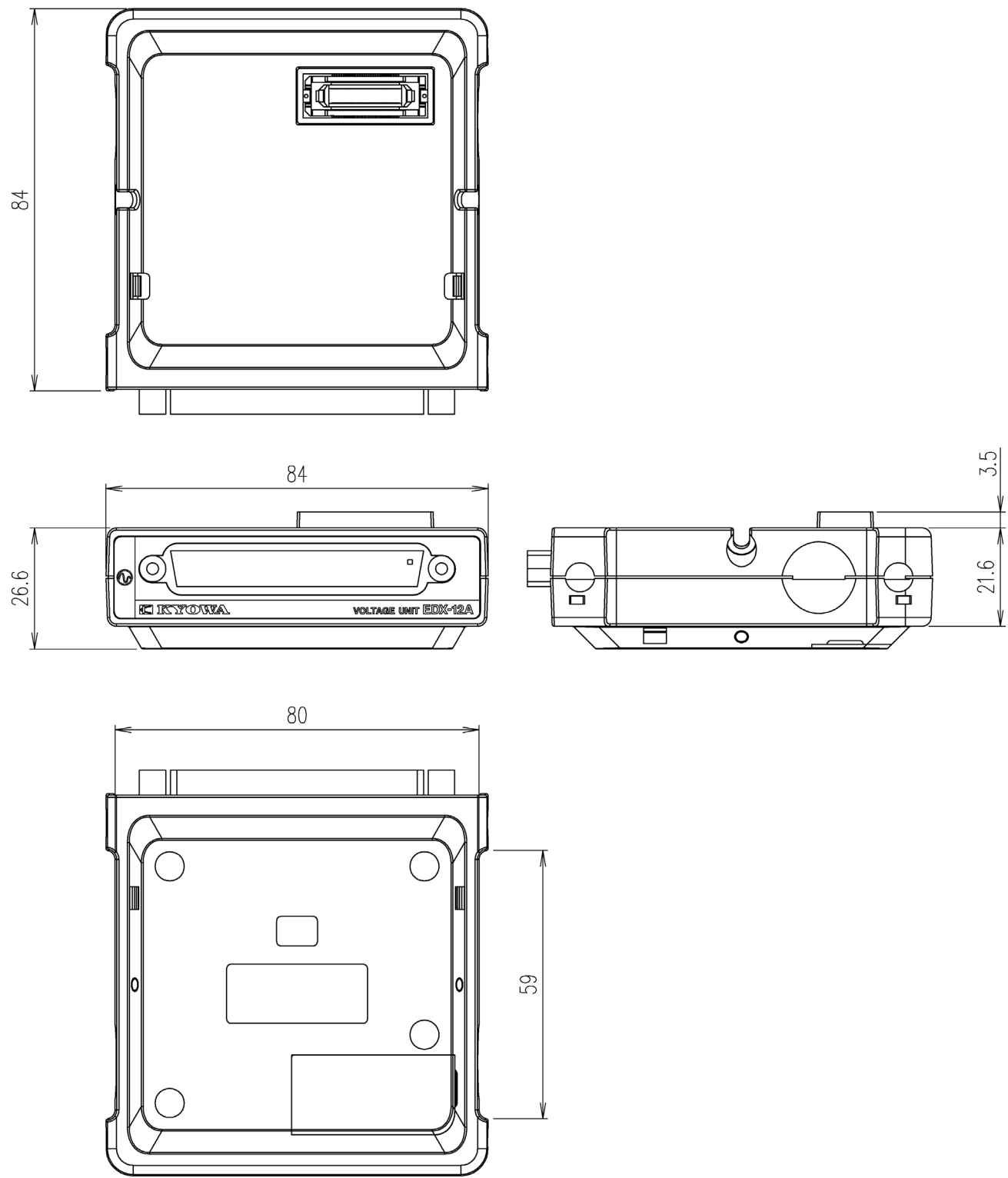
The EDX-12A is not designed for continuous operation of 24 hours.

We do not guarantee the continuous operation of the EDX-12A and shall not be responsible for any failure of the EDX-12A to perform within the warranty period.

7. SPECIFICATIONS

(1) Compatible sensor	Voltage
(2) The number of input channels	4 (single-ended)
(3) Measuring range	10 V or 50 V
(4) Range accuracy	Within $\pm 0.3\%$ FS
(5) Balance adjustment range	Within $\pm 1/2$ F.S. of setting range
(6) Nonlinearity	Within $\pm 0.1\%$ FS
(7) A/D resolution	24 bits
(8) Frequency response range	DC to 2kHz
(9) Low-pass filter	Cutoff frequency: Low (100 Hz) or High (2k Hz) Secondary Butterworth
(10) Operating temperature range	0 to +40°C
(11) Input connector	37-pin D-sub connector
(12) Power supply	5 VDC, supplied from the EDX-10A
(13) Current consumption	110 mA or less (at 5 VDC)
(14) Weight	Approx. 150g
(15) Dimensions	84.0 (W) $\times$ 26.6 (H) $\times$ 84.0 (D) mm (excluding protrusions)
(16) Compliance	Directive 2014/30/EU (EMC) Directive 2011/65/EU, (EU)2015/863 (10 restricted substances) (RoHS)

8. OUTSIDE DRAWING



Unit: mm