IM-A-980B February 2023

KYOWA
ELECTRONIC INSTRUMENTS CO., LTD.

INSTRUCTION MANUAL
EDX-13A
Compact Recording System
THERMOCOUPLE MEASURING UNIT

Thank you for purchasing KYOWA's product EDX-13A Thermocouple 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-13A. 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-13A.
When unpacking, check the contents to ensure that all accessories are enclosed.

Terminal block ····· 1
Screwdriver ····· 1
Rubber foot ····· 8/sheet
Screws (binding cross ressessed head, M3×5) ····· 2
Term and Conditions of Product Warranty ····· 1

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

The EDX-13A is designed to be used according to "8. SPECIFICATIONS."
Do not use the EDX-13A in an environment exceeding the specifications. Or, system failure may result in.

PRIOR TO USE

For safe use of the EDX-13A, 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-13A, the following symbol mark is attached to the EDX-13A.

	Indicates “PROTECTIVE GROUND TERMINAL.” Be sure to connect the GND terminal to the ground.

SAFETY SYMBOLS

For safety operation of the EDX-13A, 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-13A Instruction Manual.
- Avoid using in environment with inflammable gas, etc.
  To prevent the risk of fire hazard or explosion, do not use the EDX-13A in environment with inflammable gas, vapor, or dust.
- If any trouble occurs
  To prevent fire hazards, if smoke is emerging from the EDX-13A, immediately disconnect the USB cable or AC adapter to terminate the system operation.
- Compatible input
  The EDX-13A is a measuring instrument for thermocouples. Be sure to use the thermocouples; type K, type T, type J, and type N 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-13 Instruction Manual.
- Do not use the EDX-13A outdoors.

  Or, it may cause electric shock, fire hazard, lower the performance and cause trouble.
- Use the EDX-13A within temperature ranging from 0 to 40ºC.

  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-13A 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-13A immediately after the change in the environment.

  Leave the EDX-13A 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-13A where it is subject to significant vibration or impact.

  The vibration resistance and impact resistance are as follows.
  Vibration resistance: 29.42m/s^2 (3G), 5 to 200Hz (when operating)
  Impact Resistance: 196.1m/s^2(20G)/11msec
  Use the EDX-13A 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-13A in strong electromagnetic field.

  Use the EDX-13A 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.
- Avoid installing sensors and EDX-13A 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-13A.

  Disassembling or remodeling by user may cause electric shock hazards or damage the EDX-13A. This warranty does not cover any damaged or defective parts that results from disassembling or remodeling.
- Do not use the EDX-13A under dusty environment.

  This can lead to performance problems and decreased operating efficiency. Be careful that dust may not enter the EDX-13A not only during operation but also under stored conditions.
- Preheat the EDX-13A before use.

  After the power ON, always preheat the EDX-13A for approximately 15 minutes.

LIMITED LIFE PARTS AND PREVENTIVE MAINTENANCE

The EDX-13A 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-13A, 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-13A 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-13A.
- AC adapter (optional accessories)
  Heat and smoke will be emitted, resulting in an unstable voltage.

To operate the EDX-13A normally, finding a sign of the EDX-13A failure early by daily/periodic inspections and taking the corrective action are required. For inspection, contact KYOWA or our representatives.

*Major limited life parts; Aluminum electrolytic capacitor, AC adapter

* All components do age and will fail.

EDX-13A 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-13A.
Regardless of the replacement parts, the EDX-13A itself gradually deteriorates with age.
Before the expected service life is reached, consider replacing the EDX-13A 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 handing the EDX-13A, and to information provided for reference purposes.

Examples of Notations

NOTE

Essential precautions required when handling the EDX-13A.

MEMO

Reference items required when handling the EDX-13A.

IMPORTANT PRECAUTIONS WHEN USING EDX-13A

NOTE

1 Be sure to use the accessory screws (binding head screw, M3 × 5) for coupling measuring units.
Longer screws will damage the inner PCB components.

2. After the power ON, always preheat the EDX-13A for approximately 15 minutes.

CE MARKING

NOTE

1 Be sure to use the terminal block (standard accessory) for the EDX-13A.
2 Be sure to use the shielded cable for connecting thermocouples.
3 Be sure to connect the shield wire of the thermocouple into the SHIELD terminal of the EDX-13A.
4 The total cable length of the thermocouples must be less than 30 m.

SURFACE APPEARANCE

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

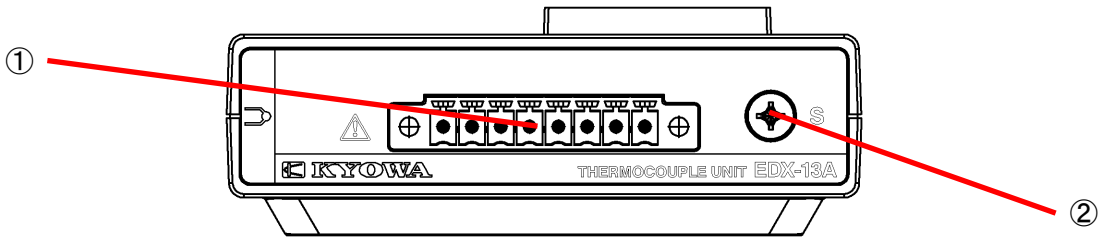
The EDX-13A is a measuring unit for thermocouples. The EDX-13A has to be installed in the EDX-10A. One EDX-13A is capable of measurement of 4 channels and maximum 16 channels with 4 EDX-13A units. When connecting one EDX-13A, the EDX-10A offers additional convenience for measurements because they are 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 connecting 4 types of thermocouples; K, T, J, and N
- The reference junction compensation can be set to the internal or external.

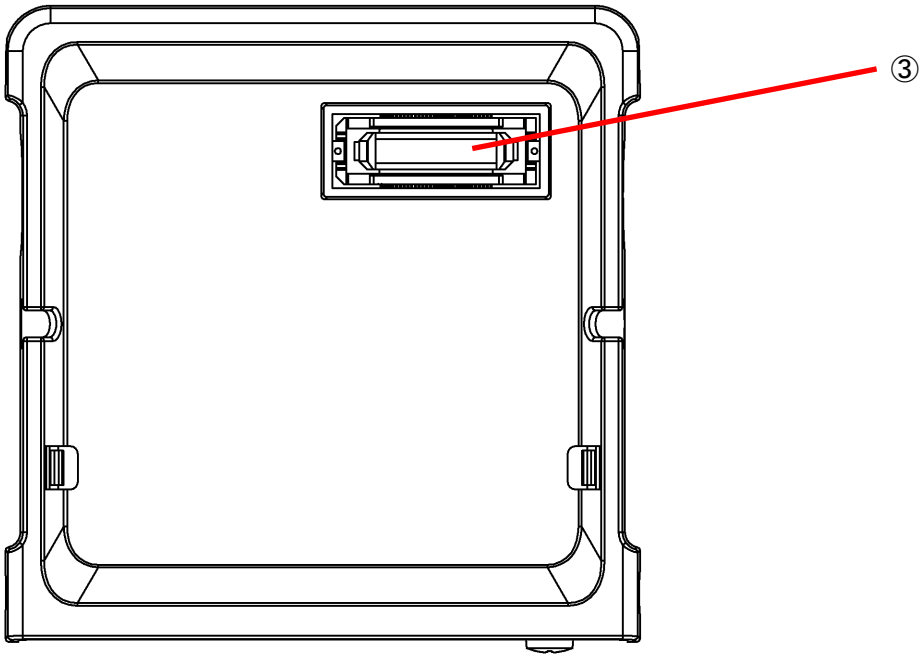
2. CONTROLS AND INDICATORS

2-1 FRONT



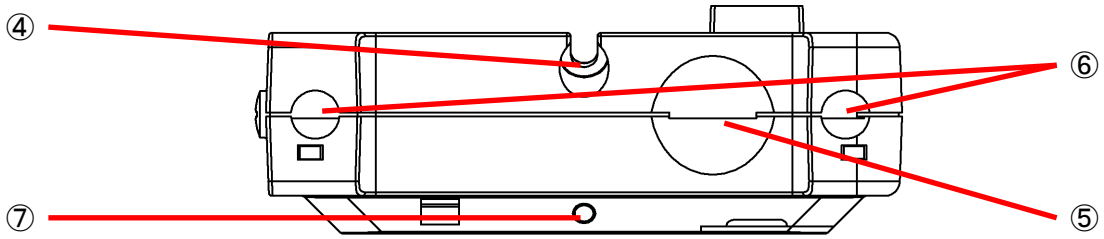
① Input connector	For connecting the terminal block (standard accessory). After connecting the terminal block, fasten the screws (right and left) on the terminal block.
② SHIELD terminal	For connecting the shield wire of the thermocouple.

2-2 TOP



③Unit-coupling connector	Connector for connecting the EDX-10A or measuring units on the EDX-13A.

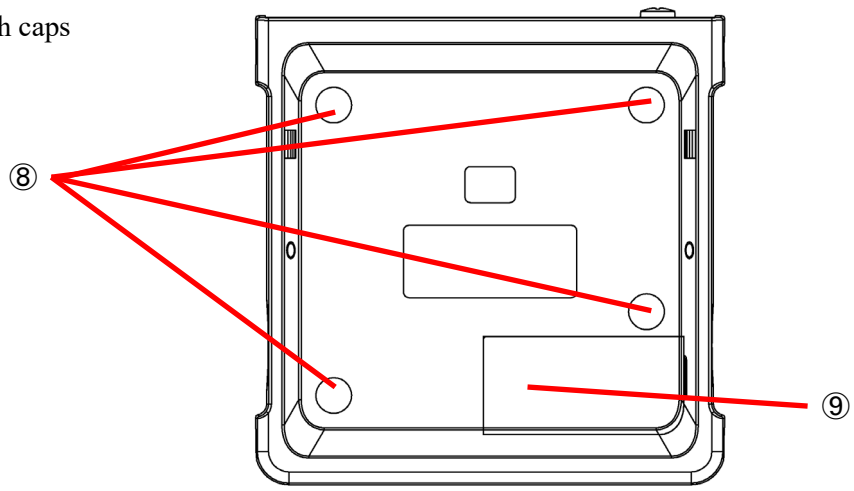
2-3 SIDE



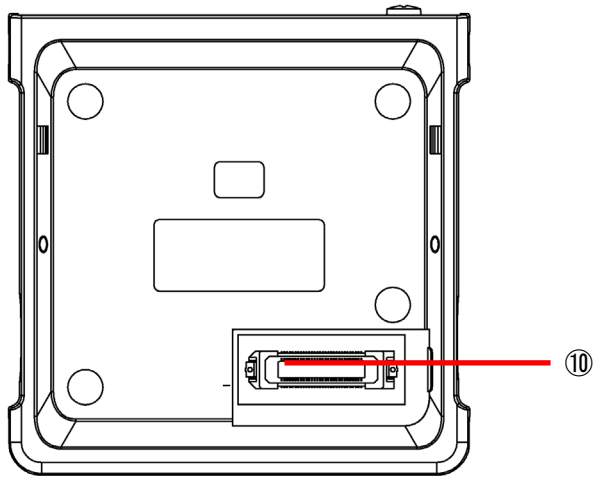
④Clearance hole	For fixing the EDX-10A or measuring unit on the EDX-13A by using a screw.
⑤Finger slot	For connecting/disconnecting the EDX-10A and a measuring unit.
⑥Rubber foot slot	The EDX-13A has small rubber feet to keep it from sliding around when placed on a flat surface.
⑦Fixing screw hole	For fixing the measuring unit, under the EDX-13A, by using a screw.

2-4 BOTTOM

With caps



Without caps

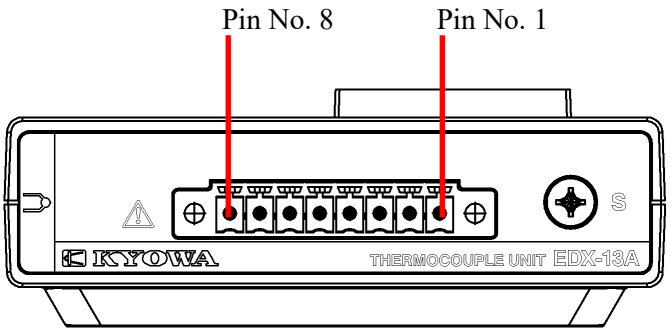


⑧Rubber foot slot	The EDX-13A has small rubber feet to keep it from sliding around when placed on a flat surface.
⑨Cap	Cap for protecting the unit-coupling connector on the EDX-13A bottom. Remove the cap before connecting measuring units.
⑩Unit-coupling connector	Connector for connecting measuring units under the EDX-13A.

3. PIN ASSIGNMENT AND CONNECTION OF INPUT CONNECTOR

3-1 PIN ASSIGNMENT OF INPUT CONNECTORS

Pin No.	Signal name
1	CH1+
2	CH1-
3	CH2+
4	CH2-
5	CH3+
6	CH3-
7	CH4+
8	CH4-



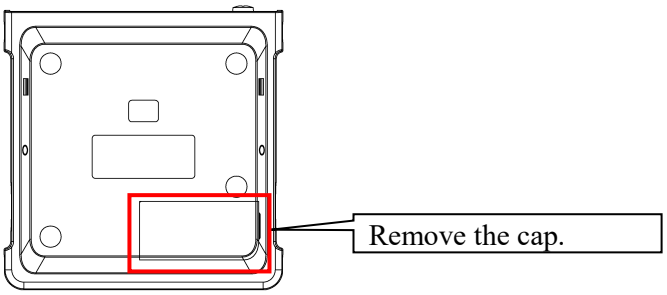
3-2 CONNECT THE MEASURING UNITS

This section describes how to connect the EDX-10A and measuring units into the EDX-13A.

NOTE

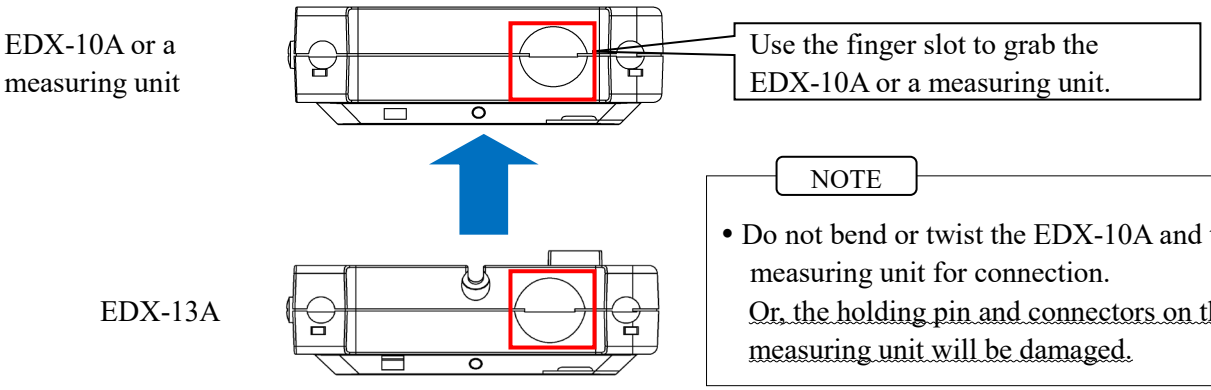
- Mount the cap to the unit-coupling connector of the very-bottom measuring unit. Or, it may cause system failures and accidents.
- You can connect the measuring units up to 4 units. Do not connect 5 or more measuring units.

1) To connect the EDX-10A or a measuring unit on the EDX-13A, 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-13A top.

Use the finger slots to connect the EDX-10A or measuring unit and EDX-13A.



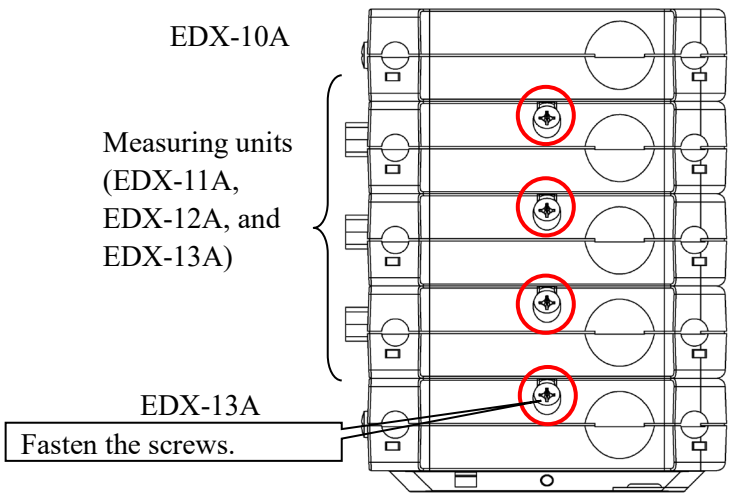
NOTE

• 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-13A, remove the cap of the EDX-13A.

4) Connect the unit-coupling connector on the EDX-13A 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
- When connecting the EDX-13A and other measuring units (EDX-11A and EDX-12A) into one EDX-10A, be sure to mount the EDX-13A at the very bottom. Or, the accuracy of the compensation of the internal reference junction will be deteriorated.

4. CONNECT THERMOCOUPLES

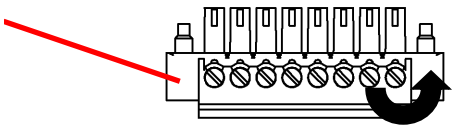
The EDX-13A is a measuring instrument for thermocouples. Connect thermocouples as follows.

NOTE

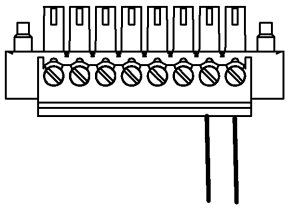
- Before connecting thermocouples, disconnect the USB cable and AC adapter from the EDX-10A to turn OFF the power.
- Before starting operation, touch a grounded source to discharge the static electricity in your body.
- Before connecting thermocouples onto the terminal block, remove the terminal block from the EDX-13A.
- Compatible wires for the terminal block are as follows.
  Solid wire: 0.14mm^2 to 1.5mm^2 (AWG16 to 25)
  Stranded wire: 0.14mm^2 to 1.5mm^2 (AWG16 to 25)

1) Turn the screw on the terminal block to counter-clockwise by using the screwdriver (standard accessory).

Terminal block
(standard accessory)



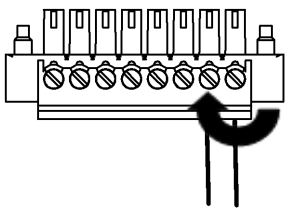
2) Insert a thermocouple into the terminal block.
Be sure to peel off the jacket of the thermocouple approximately 7 mm to 8 mm in advance.



NOTE

■Keep the correct polarity polarity of the thermocouple wires.
■If you strip off too much of the cable jacket, the core wires will extend outside the terminal block, deteriorating the accuracy of the compensation of the internal reference junction. Do not remove any more of the cables jacket than you absolutely have to.

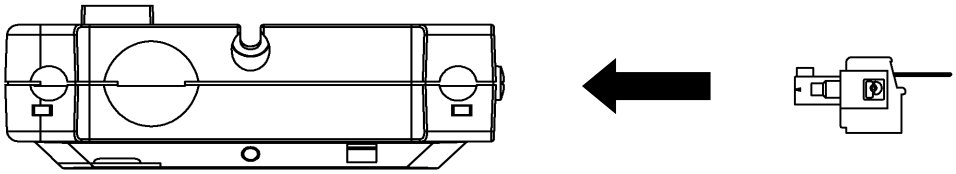
3) Turn the screw on the terminal block to clockwise by using the screwdriver (standard accessory).
The thermocouple will be fixed to the terminal block.



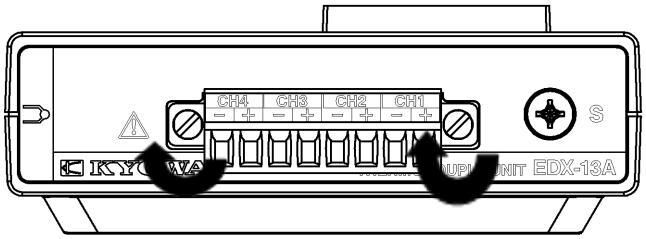
NOTE

■It takes approximately 15 minutes until the thermocouple and terminal block reach the same temperature. After connecting the thermocouple, wait until the two objects reach the same temperature.

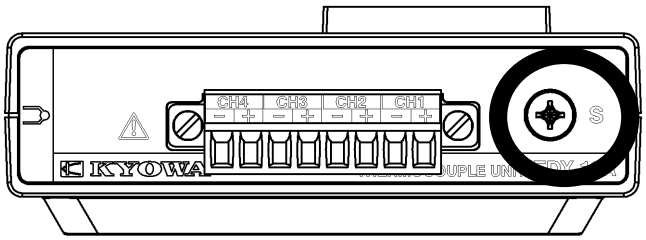
4) Insert the terminal block into the Input Connector of the EDX-13A.



5) Fasten the screws (right and left) on the terminal block by using the screwdriver (standard accessory).



6) Connect the shield wire of the thermocouple into the SHIELD terminal of the EDX-13A.



NOTE

- Be sure to use the thermocouples; type K, type T, type J, and type N only.
- Be sure to use the screwdriver (standard accessory) for connecting procedures.
- If a thermocouple is moving due to wind or if wind blows against the terminal block, resulting in an unstable output. Securely fix the thermocouple so that it will not be moved. Enclose the terminal block to protect it from wind.
- Be sure to connect the GND terminal of the EDX-10A to the ground. Grounding reduces noise.
- When the circuit is open, since a thermocouple is not connected to the channel, the measured value of the channel has uncertainly. Be sure to set the channel to “Measurement OFF”.

5. MEASURING PRECAUTIONS

5-1 BURNOUT CHECKING

The EDX-13A has a Burnout checking function which enables detecting whether the thermocouple is broken. Before measurements, perform the Burnout checking to check if the thermocouple is broken.

Passed: The thermocouple is not broken
Error: Some possible causes are as follows.

- The thermocouple is not fastened to the terminal block.
- The thermocouple is broken.

5-2 INTERNAL SAMPLING FREQUENCY

The internal sampling frequency of the EDX-13A is 2 Hz or 0.5 Hz. The default setting is 2 Hz. Under the environment where measured values vary widely, you can reduce the dispersion of measured values by selecting 0.5 Hz.

6. TROUBLE SHOOTING

When the EDX-13A does not operate as expected or when it operates unstably, trace the cause before concluding a defect of EDX-13A.
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-13A is damaged due to disassembling or remodeling by the user, KYOWA may refuse the repair.

Trouble	Checked Items and Countermeasures
The measured value is unstable.	● It takes approximately 15 minutes until the thermocouple and terminal block reach the same temperature. After connecting the thermocouple, wait until the two objects reach the same temperature. ● The output of the thermocouple is unstable. If a thermocouple is moving due to wind or if wind blows against the terminal block, resulting in an unstable output. Securely fix the thermocouple so that it will not be moved. Enclose the terminal block to protect it from wind. ● The output of the thermocouple is incorrect when the thermocouple breaks. Check if the thermocouple breaks with the Burnout checking. Or replace the thermocouple with a new one. ● The measured value is unstable if the EDX-13A is placed near a heat source or if the EDX-13A is located where temperature varies a lot. Keep the EDX-13A away from heat source. Then measure data under constant-temperature environment. ● If troubles are not solved despite countermeasures, contact KYOWA or our representative.
Measured values vary widely.	● Be sure to connect the GND terminal of the EDX-10A to the ground. ● Do not locate the EDX-13A near the inverter motor, machine tool, welding machine, or AC motor power supply. Separately locate the EDX-13A from the power source. For details, see the following MEMO.
	● Set the internal sampling frequency to 0.5 Hz to reduce the dispersion of measured values.

MEMO

Inductive interference

Using the EDX-13A, near equipment generating strong magnetic field, generates induction noise.
The equipment includes large motors, transformer, and ferro-resonant constant voltage transformer.
Locating the EDX-13A, far away from measuring points, also generates induction noise.
Take the following measures to protect against induction noise.

- Separately locate the EDX-13A from the power source.
- Use a shielded twisted-pair cable for thermocouple connection. Connect the shield wire to the SHIELD terminal of the EDX-13A.

Potential interference

Potential interference occurs when the target to be measured has a DC/AC potential.
At this time, grounding the EDX-13A 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 measured to obtain the most preferable results.

7. MAINTENANCE

For the EDX-13A, 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-13A is used continuously for long periods of time, early replacement of parts is required for the purposes of safety and stable operation. The EDX-13A is not designed for continuous operation of 24 hours.
We do not guarantee the continuous operation of the EDX-13A and shall not be responsible for any failure of the EDX-13A to perform within the warranty period.

8. SPECIFICATIONS

1) Compatible sensor Thermocouples

2) The number of input channels 4

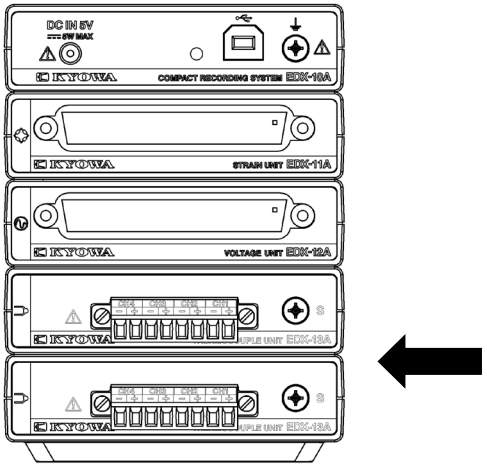
3) Compatible thermocouple K, T, J, N
Resistance of the thermocouples: 1kΩ or less

4) Measuring range, resolution, measuring accuracy, and accuracy of the internal reference junction compensation

Type	Measuring range	Resolution	Measuring accuracy		Accuracy of internal reference junction compensation
K	-200.0 to +1370.0˚C	0.1˚C	-200.0 to lower than -100.0˚C -100.0 to +1370.0˚C	±(0.2% of the reading value + 0.6˚C) ±(0.1% of the reading value + 0.4˚C)	±1.0˚C when the input terminal temperature is stable. Ambient temperature range: 25±10˚C * Based on the following conditions 1 and 2.
T	-200.0 to +400.0˚C		-200.0 to lower than -100.0˚C -100.0 to +400.0˚C	±(0.2% of the reading value + 0.6˚C) ±(0.1% of the reading value + 0.4˚C)	
J	-200.0 to +1200.0˚C		-200.0 to lower than -100.0˚C -100.0 to +1200.0˚C	±(0.2% of the reading value + 0.6˚C) ±(0.1% of the reading value + 0.4˚C)	±2.0˚C when the input terminal temperature is stable. Ambient temperature range Within the operating temperature range but exceeding 25±10˚C
N	-200.0 to +1300.0˚C		-200.0 to lower than -100.0˚C -100.0 to +1300.0˚C	±(0.2% of the reading value + 0.6˚C) ±(0.1% of the reading value + 0.4˚C)	

* The accuracy of the internal reference compensation junction and accuracy of sensors are not included. Measurement error of compensating internal reference junction is obtained as a sum of "error due to measuring accuracy", "error due to internal reference junction compensator", and "error due to the thermocouple".

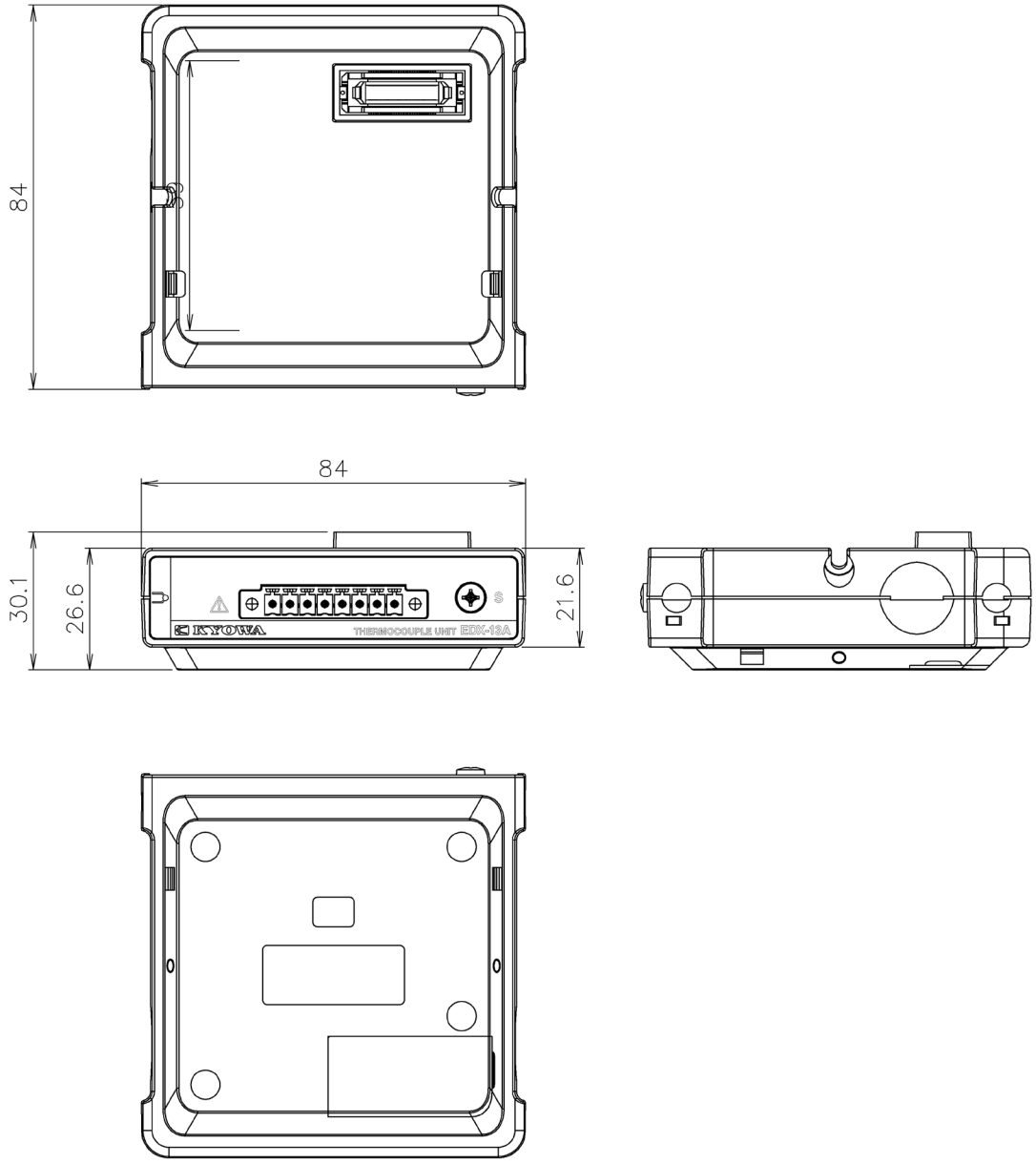
* To satisfy the accuracy of the internal reference junction compensation ±1.0˚C
Condition No. 1: When connecting the EDX-13A and other measuring units (EDX-11A and EDX-12A) into one EDX-10A, be sure to mount the EDX-13A at the very bottom.
Condition No. 2: Connect as follows.



When connecting the EDX-13A and other measuring units (EDX-11A and EDX-12A) into one EDX-10A, be sure to mount the EDX-13A at the very bottom.

5) Reference junction compensation	Internal or external
6) Check function	Burnout Checking
7) A/D resolution	24 bits
8) Sampling method	Scanning
9) Internal sampling frequency	Approx. 0.5 Hz or approx. 2 Hz
10) Operating temperature range	0˚C to +40˚C
11) Input connector	Screw-fixed terminal block
12) Power supply	5 VDC, supplied from the EDX-10A
13) Current consumption	120mA or less (at 5 VDC)
14) Weight	Approx. 130g
15) Dimensions	84.0 (W) × 26.6 (H) ×84.0 (D) mm (excluding protrusions)
16) Compliance	Directive 2014/30/EU (EMC) Directive 2011/65/EU,(EU)2015/863(10 restricted substances) (RoHS)

9. OUTSIDE DRAWING



Unit: mm