

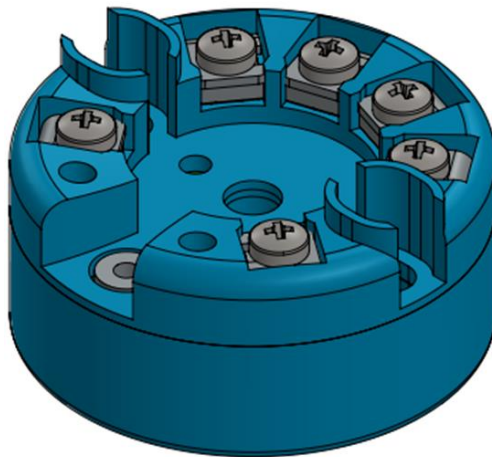


INSTRUCTION MANUAL

4-20mA Signal Converter for Pyranometers

MC-11

Version Number: 3



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2. Important User Information

Thank you for using EKO Products

Make sure to read this instruction manual thoroughly and to understand the contents before starting to operate the instrument. Keep this manual at safe and handy place for whenever it is needed.

For any questions, please contact us at one of the EKO offices given below:

2-1. Contact Information

EKO INSTRUMENTS CO., LTD.

Asia, Oceania Region

| | | |
|----------------|-----------------------------|------------------------|
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| | | |
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| www.eko-eu.com | EKO INSTRUMENTS Europe B.V. | |
| info@eko-eu.com | Lulofsstraat 55, Unit 32, | Tel: +31 (0)70 3050117 |
| | 2521 AL, Den Haag, The Netherlands | Fax: +31 (0)70 3840607 |

North & South America Region

| | | |
|------------------|-----------------------------------|----------------------|
| www.eko-usa.com | EKO INSTRUMENTS USA Inc. | |
| info@eko-usa.com | 95 South Market Street, Suite 300 | Tel: +1 408-977-7751 |
| | San Jose, CA 95113 USA | Fax: +1 408-977-7741 |

2-2. Warranty and Liability

For warranty terms and conditions, contact EKO or your distributor for further details.

EKO guarantees that the product delivered to customer has been verified, checked and tested to ensure that the product meets the appropriate specifications. The product warranty is valid only if the product has been installed and used according to the directives provided in this instruction manual.

In case of any manufacturing defect, the product will be repaired or replaced under warranty. However, the warranty does not apply if:

- Any modification or repair was done by any person or organization other than EKO service personnel.
- The damage or defect is caused by not respecting the instructions of use as given on the product brochure or the instruction manual.

2-3. About Instruction Manual

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This manual was issued: 2016/06/30
Version Number: 3

2-4. Environment

1. WEEE Directive 2002/96/EC (Waste Electrical and Electronic Equipment)

This product is not subjected to WEEE Directive 2002/96/EC however it should not be mixed with general household waste. For proper treatment, recovery and recycling, please take this product(s) to designated collection points.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

2. RoHS Directive 2002/95/EC

EKO Instruments has completed a comprehensive evaluation of its product range to ensure compliance with RoHS Directive 2002/95/EC regarding maximum concentration values for substances. As a result all products are manufactured using raw materials that do not contain any of the restricted substances referred to in the RoHS Directive 2002/95/EC at concentration levels in excess of those permitted under the RoHS Directive 2002/95/EC, or up to levels allowed in excess of these concentrations by the Annex to the RoHS Directive 2002/95/EC.

2-5. CE Declaration



IMPORTANT USER INFORMATION



DECLARATION OF CONFORMITY

We: EKO INSTRUMENTS CO., LTD
1-21-8 Hatagaya Shibuya-ku,
Tokyo 151-0072 JAPAN

Declare under our sole responsibility that the product:

Product Name: 4 to 20mA Signal Converter
Model No.: MC-11

To which this declaration relates is in conformity with the following harmonized standards of other normative documents:

Harmonized standards:

EN 61326-1:2013 Class A (Emission)
EN 61326-1:2013 (Immunity)

Test was done in this condition which are signal cable length is under 3m and used the metal box.

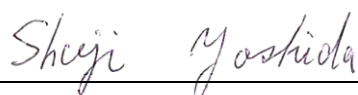
Following the provisions of the directive:

EMC-directive: 2004/108/EC

Date: July. 1, 2015

Position of Authorized Signatory: Deputy General Manager of Quality Assurance Dept.

Name of Authorized Signatory: Shuji Yoshida

Signature of Authorized Signatory: 

3. Safety Information

EKO Products are designed and manufactured with consideration for safety; however, please make sure to read and understand this instruction manual thoroughly to be able to operate the instrument safely in the correct manner.



WARNING CAUTION

Attention to user; pay attention to the instructions given on the instruction manual with this sign.



3-1. WARNING/CAUTION

1. Setup

- Install MC-11 in a dry place (where MC-11 will not get wet or soaked in water).
- Do not install MC-11 in direct sun light.
- Use MC-11 with grounding connection.
- Although this product is tested to meet EMC Directive compliance requirements, it may not fully satisfy its primary specification/performance when using this product near following locations where strong electromagnetic wave is generated. Please pay attention to the installation environment.
 - Outdoor: High voltage power line, power receiver/distribution facility, etc.
 - Indoor: Large-size chiller, large rotation device, microwave, etc.

2. Power Supply

- Always check the voltage and AC/DC type for the specified supply power before connecting the MC-11. If wrong type of power supply is connected, it may cause MC-11 malfunction and lead to accidents.
- Use with fuse around 0.5A connected in series on the power supply cable. Depending on the power supply connected, large current may flow when the internal malfunction occur, and may lead to generating heat and fire.

4. Introduction

4-1. Main Functions

Pyranometer Signal Converter MC-11 is a compact signal converter which converts the voltage signal output (mV) from sensors like pyranometers into current loop signal output (mA). The output range of the current loop is between 4 to 20mA; 4mA is equivalent to $0W/m^2$, 20mA is equivalent to $1,600W/m^2$ of solar irradiance. (This setting can be changed using the optional signal converter configuration cable and Configurator Software.)

By converting the output into current loop signal, not only it makes easier to connect the pyranometers to PV monitoring devices, it also reduce impacts from noise and signal level decrease when transmitting in a long distance.







By using the signal converter configuration cable (optional) and the Configurator Software (optional), the measurement configuration for the signal converter can be changed.

With IP65 signal converter box (optional), it can be installed outdoor.

4-2. Package Contents

Check the package contents first; if any missing item or damage is noticed, please contact EKO immediately.

Table 4-1 Package Contents

| Standard Items | Qty. | Remarks |
|--|--------|---|
| 4-20mA Signal Converter | 1 unit |  |
| L-Shaped Tab Terminals (Male) | 4 pcs. |  |
| Plug-Type Crimping Terminals | 4 pcs. |  |
| Round-Type Grounding Terminal | 1 pc. |  |
| Double-Sems Screw for Grounding Terminal | 1pc. |  |
| Double-Sems Screws for Installation | 2pcs |  |
| Inspection Report | 1 | |
| Instruction Manual | -- | Not included in the package. Please download from EKO Website |

5. Getting Started

5-1. Parts Name

Each part name and its main functions are described below.

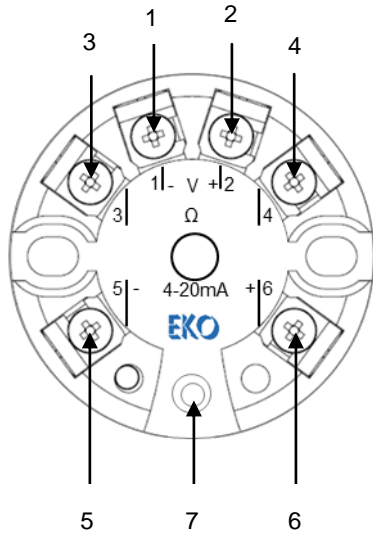


Figure 5-1. Parts Name

Table 5-1. Parts Name and Terminal Numbers

| Parts Name | | Terminal Numbers |
|------------|---|------------------|
| 1 | Pyranometer Voltage Signal Input Terminal (-) | 1 |
| 2 | Pyranometer Voltage Signal Input Terminal (+) | 2 |
| 3 | NTC Thermistor Connection Terminal | 3 |
| 4 | NTC Thermistor Connection Terminal | 4 |
| 5 | 4-20mA Output & Power Supply Input Terminal (-) | 5 |
| 6 | 4-20mA Output & Power Supply Input Terminal (+) | 6 |
| 7 | Grounding Terminal | N/A |

5-2. Setup

1. Installation

- 1) Install MC-11 in dry location (where it will not get wet or get soaked in water).
- 2) Keep MC-11 away from direct sunlight.
- 3) When fixing the MC-11 to mounting plate, use provided Double-Sems Screws for installation. Maximum torque for fastening the MC-11 to mounting is 0.4N/m.

NOTE: MC-11 is paired with the pyranometer which is purchased together; when connecting with the pyranometer, make sure to connect with the right pyranometer. Use the pyranometer with same serial number stated on the MC-11 inspection report.

NOTE: The recommended maximum length of 4-20mA signal cable is 300m when using DC24V power supply and AWG25 (0.2sq) cable.

2. Wiring

- 1) Attach the provided L-shaped tab terminal (male) to the terminal numbers 1, 2, 5, and 6.
- 2) Crimp and connect the plug-type crimping terminal (female) to input and output cable ends. (Please use crimping tool that is for crimping terminal with insulating coating applicable for 1.25mm²).
- 3) Connect the L-shaped tab terminal (male) attached to the MC-11 and plug-type crimping terminal (female).
- 4) There are 2 ways to connect with the peripheral devices:
 - Using Current Meter: As shown on Figure 5-2, insert the current meter directly to the 4-20mA current loop circuit and measure its value.
 - Using Voltmeter: As shown on Figure 5-3, insert shunt resistance to the 4-20mA current loop circuit and measure the voltage at both ends of resistance. When 250Ω shunt resistance value for example is inserted, 4-20mA is converted into 1-5V. Prepare shunt resistance according to the measurement range of voltmeter to be used. Moreover, voltage decreases by inserting shunt resistance; please keep this in mind when selecting power supply voltage.
- 5) Connect the shield cable from Pyranometer to grounding terminal on MC-11. Also ground the MC-11 grounding terminal. When connecting the cable to the grounding terminal, use provided round terminal for grounding terminal and double-sems screw for grounding terminal.
- 6) Prepare a fuse with rated current 0.5A. Using the fuse holder specified for this fuse, connect in series to the power supply. Depending on the connecting power supply, there are risks for internal malfunction and generating heat and fire when large amount of current flows
- 7) To use the temperature compensation function using a pyranometer with output wire for NTC Thermistor (44031, 10kΩ), connect this output wire to terminal numbers 3 and 4.
(To use the temperature compensation function, optional converter configuration cable and Configurator Software are required)

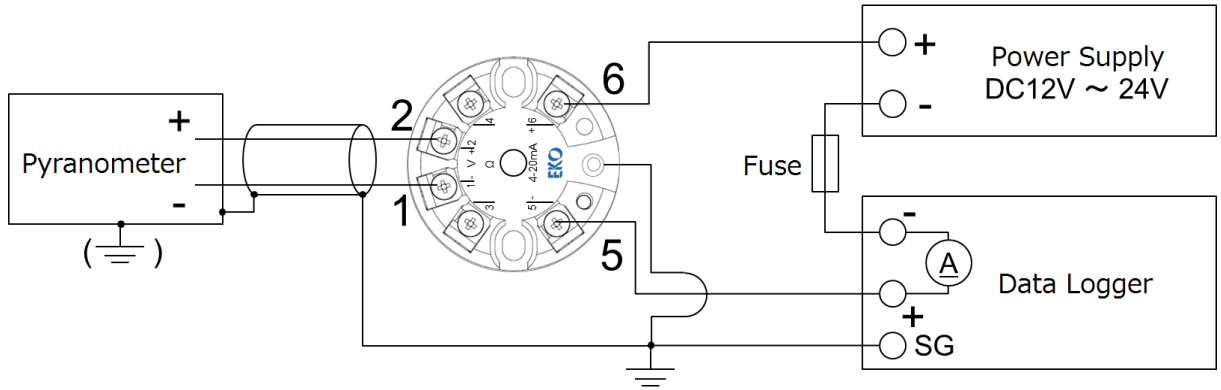


Figure 5-2. Wiring (when using current meter)

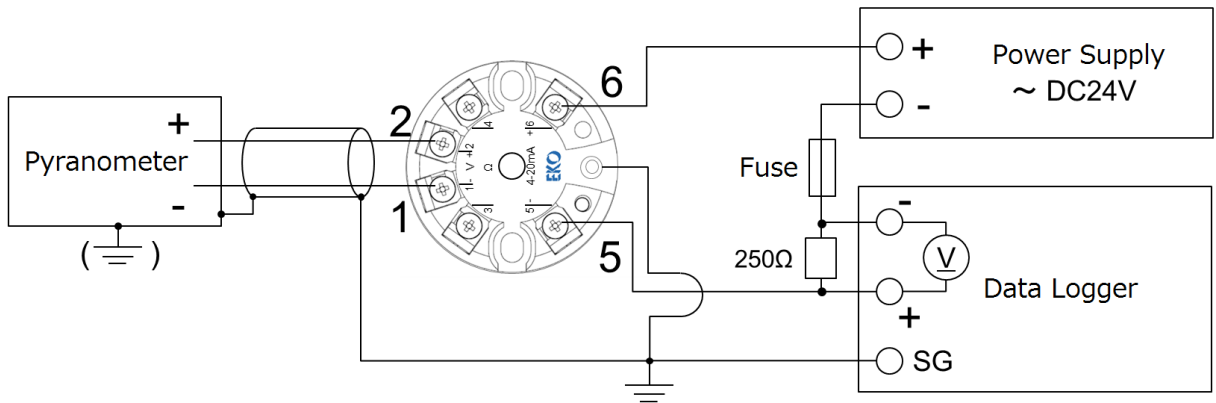


Figure 5-3. Wiring (when using voltmeter)

5-3. Measurement

1. Calculation of Solar Irradiance from Current Output

To determine the solar irradiance [W/m²], apply the current loop signal [mA] from the Signal Converter or voltage value measured at both side of shunt resistance [V] to the following conversion formula:

Calculation Method for Solar Irradiance [W/m²]

When using measuring device with current input (the wiring connection case of Figure 5-2):

To convert the measured current loop signal (4-20mA) into solar irradiance, use following formula:

$$Ir[W / m^2] = \frac{I_{out}[mA] - 4[mA]}{20[mA] - 4[mA]} * Ir_{max}[W / m^2]$$

Where:

Ir = Solar Irradiance [W/m²]

I_{out} = Measured Current Loop Signal [mA]

I_{rmax} = Maximum Irradiance Setting Value* (Default value: 1,600W/m²)

*The maximum irradiance setting value can be changed using optional converter configuration cable and Configurator Software.

When using measuring device with voltage input (Shunt resistance is required(Figure 5-3):

To convert the measured voltage at both sides of shunt resistance into solar irradiance, use following formula:

$$Ir[W / m^2] = \frac{\frac{V[V]}{R[\Omega]} * 1,000 - 4[mA]}{20[mA] - 4[mA]} * Ir_{max}[W / m^2]$$

Where:

Ir = Solar Irradiance [W/m²]

V = Measured Voltage [V]

R = Shunt Resistance Value [Ω]

I_{rmax} = Maximum Irradiance Setting Value* (Default value: 1,600W/m²)

*The maximum irradiance setting value can be changed using optional converter configuration cable and Configurator Software.

6. Troubleshooting

6-1. Troubleshooting

Check the following items in case of trouble with the instrument. If any questions should remain, contact EKO for further technical support.

Table 6-1. Troubleshooting

| Failure | Action |
|--|--|
| There is no output from the signal converter. | Check the output cable connection, and make sure there are no disconnections and the pyranometer is surely connected. Check to make sure that appropriate power supply voltage is supplied. |
| Output value from the signal converter is not appropriate. | Check the pyranometer serial number; make sure it is same as the serial number stated on the inspection report. |
| There is output more than 20mA from the signal converter. | Check the pyranometer is connected. (When pyranometer signal input terminal is in opened condition, the output will be larger than 20mA.) |
| There is output less than 4mA from the signal converter. | Check wither the + and – wirings are connected in reverse. NOTE: This phenomenon is not an abnormal condition; there are cases that less than 4mA output show due to pyranometer zero-offset effects. |
| Signal converter output is unstable. | Check for any loose wire/cable connections. |

7. Specification

7-1. Transducer Specification

Table 7-1. Transducer Specification

| Characteristics | Details |
|---|--|
| Input Range | DC 0 to 100mV |
| Output | DC 4 to 20mA |
| Resolution | <5 μ V |
| Input Impedance | > 10M Ω |
| Temperature Response (-20~50°C) | < 0.2% |
| Accuracy Assured Operating Temperature Range* | -20 to +50°C |
| Operating Temperature Range | -40 to +80°C |
| Operating Humidity Range | \leq 95RH% (no condensation) |
| Response Time | 1sec. (99% Output) |
| Non-Linearity | < 0.1% (0 to 100mV) |
| Zero Offset | <5 μ V (Output offset value when 0mV is input) |
| Power Supply Voltage Conversion Error | <0.05% (When supply voltage changed from 12V to 24V) |
| Power Supply | DC 12 to 24 V \pm 10% |
| Power Consumption | 0.08 to 0.75W |
| Dimension | ϕ 45 \times 23mm |
| Weight | 0.03kg |

*When the Signal Converter is used in ambient temperature over the Accuracy Assured Operating Temperature Range, the measurement error may increase.

7-2. Dimensions

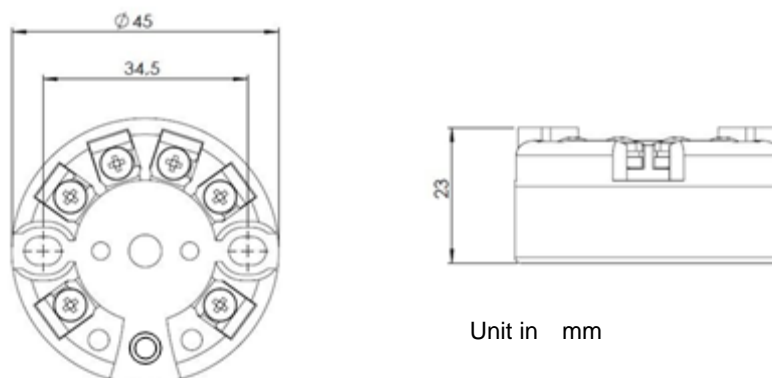


Figure 7-1. Dimensions

7-3. Accessories List

Table 7-2. Accessories List

| Option Items | Remarks |
|--|--|
| Signal Converter Configurator Cable | Cable Length: 1m |
| Signal Converter Configurator Software | Program Name: EKO Sense Configurator |
| Signal Converter Box 1 | Box for 1 unit signal converter (Includes: 4pcs M4 screws, 4pcs Mounting Feet, 3pcs Blind Bar) |
| Signal Converter Box 2 | Box for 2 units of signal converter (Includes: 4pcs M4 screws, 4pcs Mounting Feet, 4pcs Blind Bar) |

APPENDIX

A-1. Optional Items

1. Signal Converter Configurator Cable

A cable for the Signal Converter configuration; this cable and the Signal Converter Configurator Software are required for configuration. The configuration procedure is explained in A-1, [2. Configurator Software] section

TableA-1. Package Content

| Items | Qty. | Remarks |
|--------------------------------------|------|------------------|
| Signal Converter Configuration Cable | 1 | Cable Length: 1m |

1) Specification

Table A-2. Specification for Signal Converter Cable

| Items | Specifications |
|---------------|--|
| Applicable OS | Microsoft ® Windows XP, Vista, 7, 8, 8.1 |
| Interface | USB2.0 |
| Weight | 0.15 kg |
| Cable Length | 1.0m |

2. Signal Converter Configurator Software

Configurator Software is used for changing each configuration on the Signal Converter and easy data review.

1) Specification

Table A-3. Specification for Configurator Software

| Items | Specifications |
|-----------------------|---|
| Name of Program | EKO Sense Configurator |
| Applicable OS | Windows XP, Vista, 7, 8, 8.1 |
| License | No limitation |
| Operation Environment | CPU: Applicable OS is operational Memory: Applicable OS is operational Hard Disk Capacity: More than 100MB Display Resolution: More than 800x600 |

2) Installation Procedure

Follow below procedure to install the Signal Converter Configurator Software:

- a. Download the latest version of Signal Converter Configurator Software from the EKO Website.
MC-11 product page: <http://eko-eu.com/>
- b. When the installer file is executed, following Welcome Window appears. Click [Next] button (Depending on the operating system, message for installation authorization may appear.)

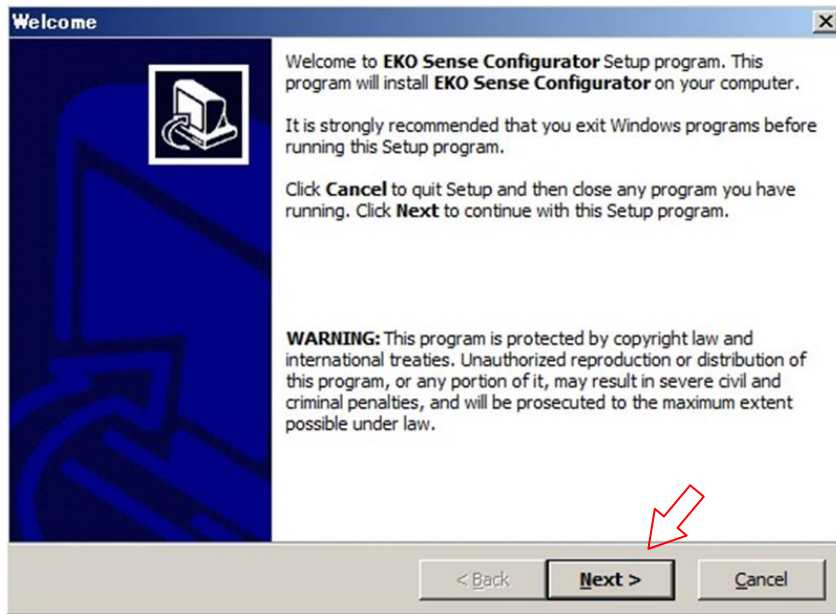


Figure A-1. Welcome Window

- c. Assign the folder for installation, and click [Next] button.

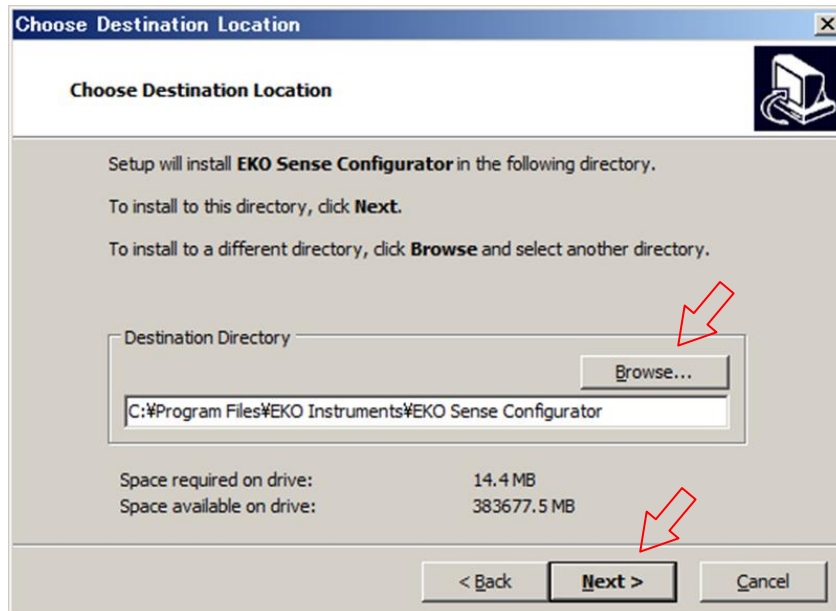


Figure A-2. Choose Destination Location Window

- d. In the following window, decide whether to add short cut for this software to Windows Start Menu and on Desktop. As default setting, the shortcuts are added to the Start Menu and Desktop. Remove the checks from the checkboxes as necessary, then click [Next] button.

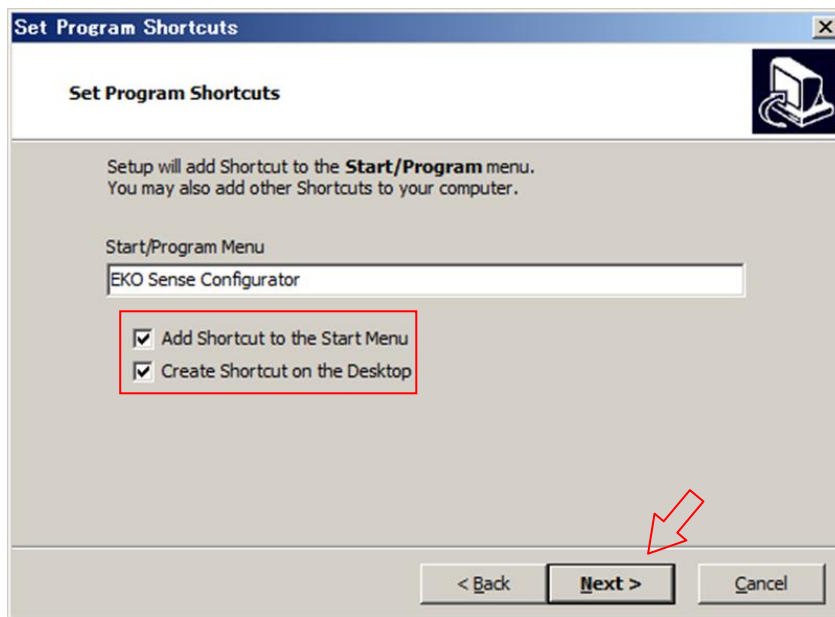


Figure A-3. Set Program Shortcuts Window

- e. In the following window, click [Next] button to start the files required for the software to be copied to your computer

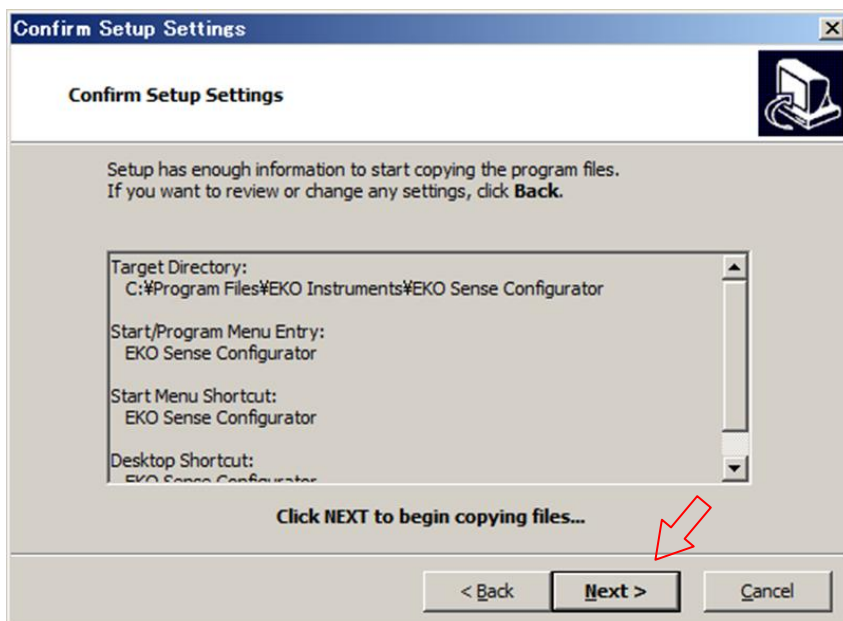
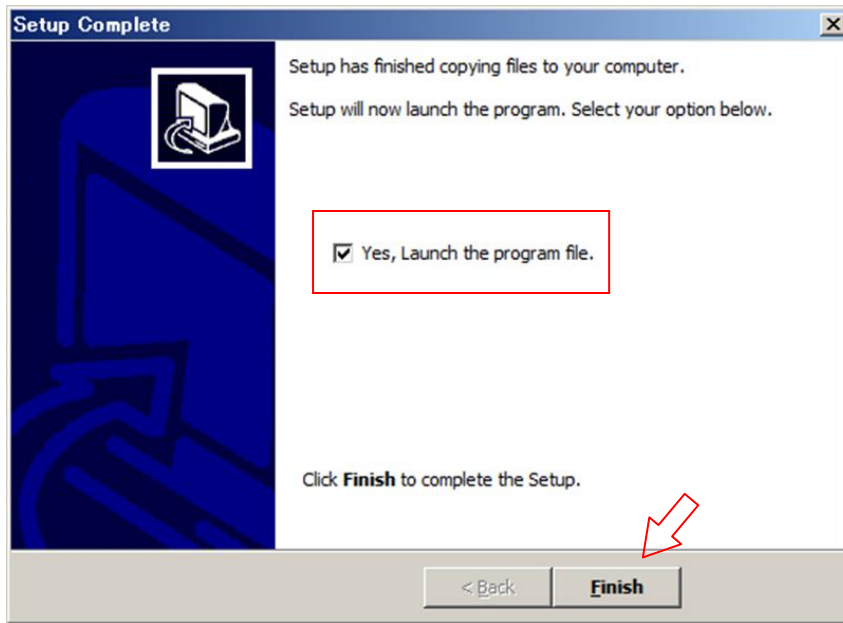


Figure A-4. Confirm Setup Settings Window

- f. When all the files are copied to your computer, following window appears. By clicking [Finish] button, the software installation is finished and software starts up. If you don't want to start the software immediately, place a check on checkbox before clicking the [Finish] button.



☒ A-5. Setup Complete Window

3) Connection Procedure

- a. When configuring the Signal Converter, connect the Signal Converter according to the Figure A-6
- b. Connect the Configurator Cable and PC with USB.
Connect the Red alligator clip on Configurator Cable to No.6 terminal, and Black alligator clip on Configurator Cable to No. 5 terminal on the Signal Converter. (Figure A-7)

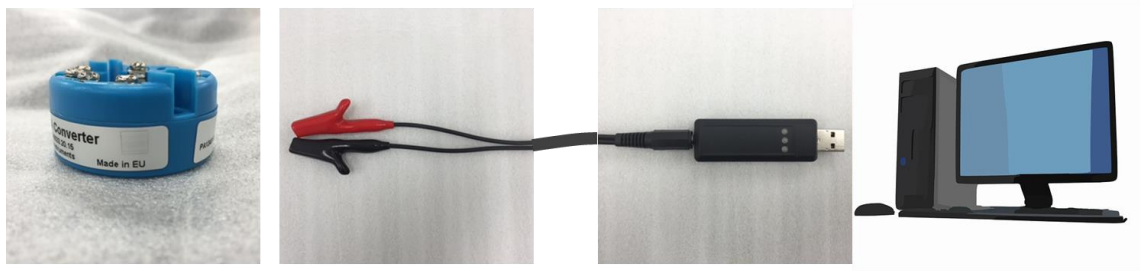


Figure A-6. Connection for Configuring the Signal Converter



Figure A-7. Connection between the Signal Converter and Configurator Cable

4) Signal Converter Configuration Procedure

- a. Startup the software (EKO Sense Configurator). Initial setting of the language is English at the time of software startup. If necessary, change the language setting from the tool bar at the top of the window (Tools → Language). (There are English, Portuguese, Spanish, and Japanese available.)

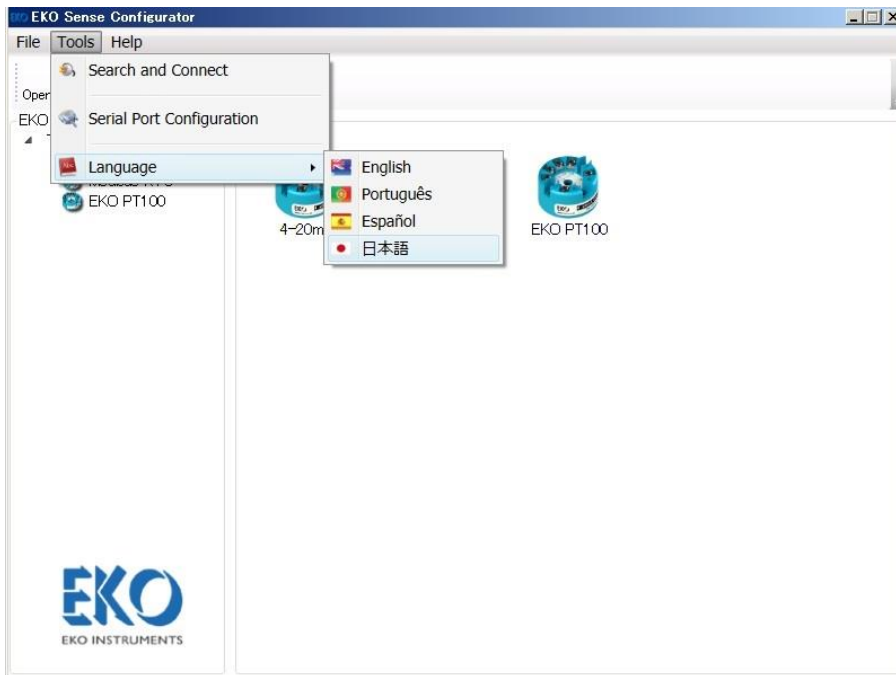


Figure A-8. Language Setting Window

- b. Next, select the product that you want to change configuration. Select "4-20mA" from the list.

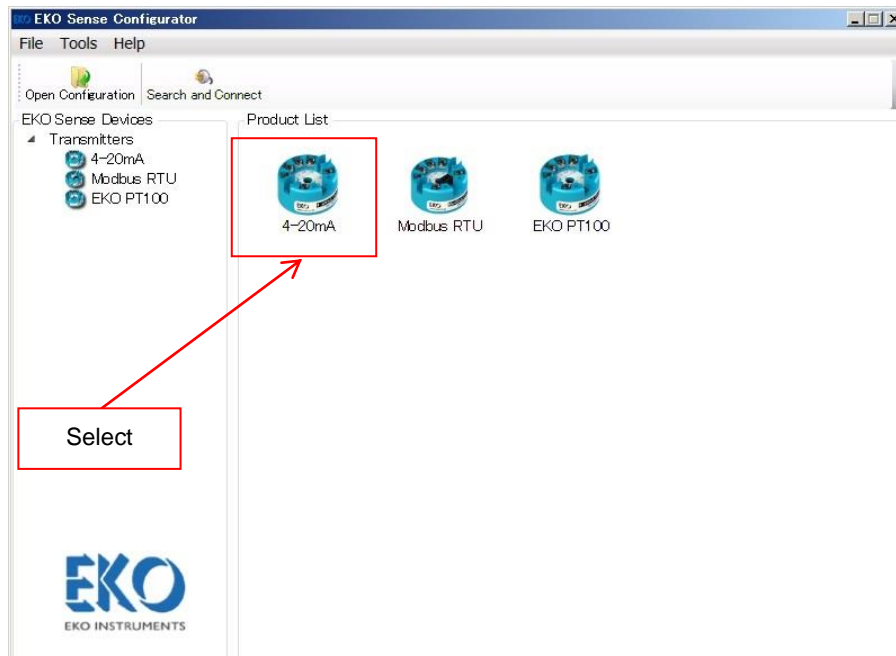


Figure A-9. Product List Window

- c. After connecting between PC, configurator cable and Signal converter according to the previous step in [3) Connection Procedure], click “Search and Connect” from “Tool” menu (Figure A-10). The connection is automatically established, and the connection is completed when it is indicated as “Read OK (Figure A-12)”

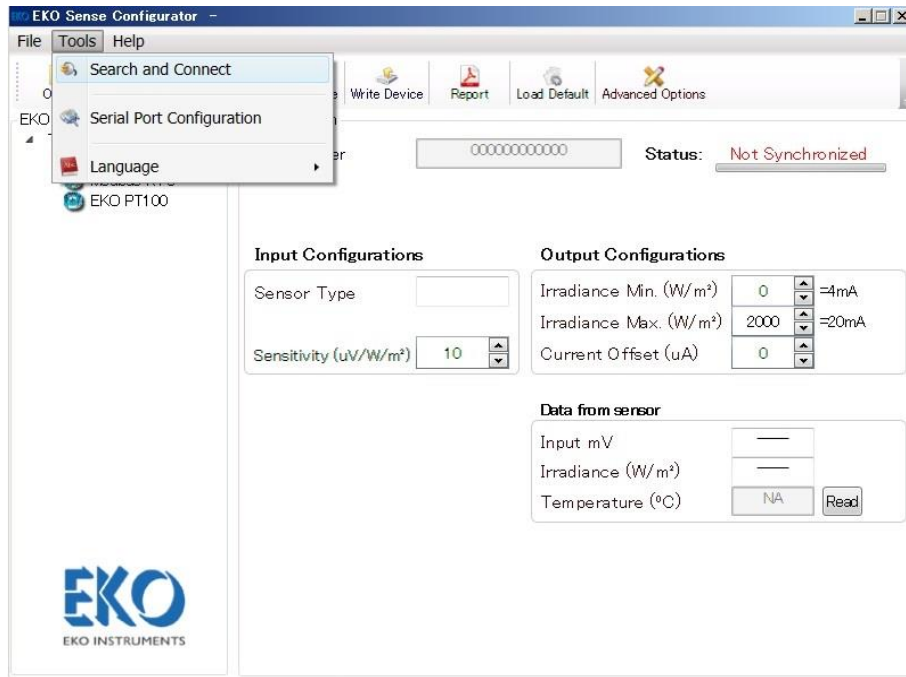


Figure A-10. Device Search & Connection Button

If the connection is not established automatically, check the setting for serial port to be connected, and follow below procedure.

When “Serial Port Setting” is selected from the “Tools”, following window appears (Figure A-11). Select the serial port that USB is connected from the “Serial Port” in the Serial Port Settings. Do not change any settings other than the “Serial Port” or it cannot get connection.

The default setting values are as follows:

<Serial Port Settings>

Baud Rate : 1200, Data Bits : 8, Parity : None, Stop Bits : 2, Handshaking : None

<Line Signals>

Non selectable

<Data Mode>

Big Endian Unicode

<Serial Port Timeouts>

Read Timeout (ms) : 1000, Write Timeout (ms) : 1000

After selecting the “Serial Port”, click [Save] button to save the setting. After saving the setting, click [x] button at the top of the Serial_Port_Config window to close this window.

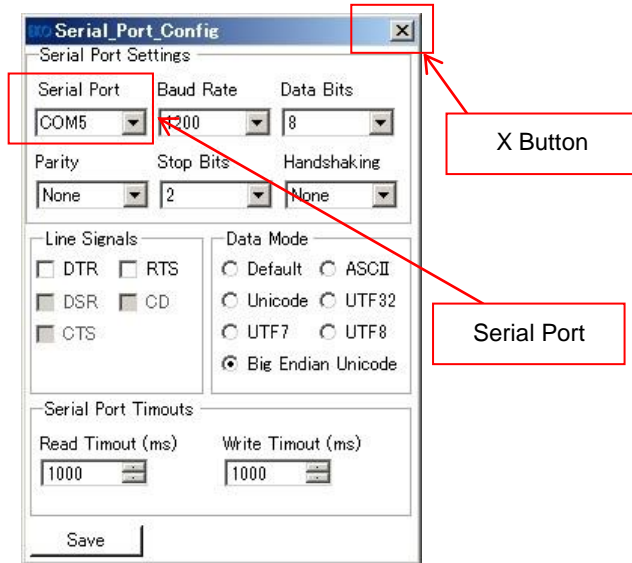


Figure A-11. Serial_Port_Config Window

- d. Enter the pyranometer model number, sensitivity, minimum irradiance, maximum irradiance, and offset value.
- Pyranometer Model: Model number of Pyranometer to be connected (i.e. MS-802)
 - Sensitivity: Sensitivity of Pyranometer to be connected (i.e. 10 $\mu\text{V}/\text{W}/\text{m}^2$)
 - Minimum Irradiance: Solar irradiance equivalent to the 4mA which is the minimum value of current loop signal (i.e. 0 W/m^2)
 - Maximum Irradiance: Solar irradiance equivalent to 20mA which is the maximum value of current loop signal (i.e. 1600 W/m^2)
 - Offset Value: Offset for current loop signal (i.e. 0 μV)

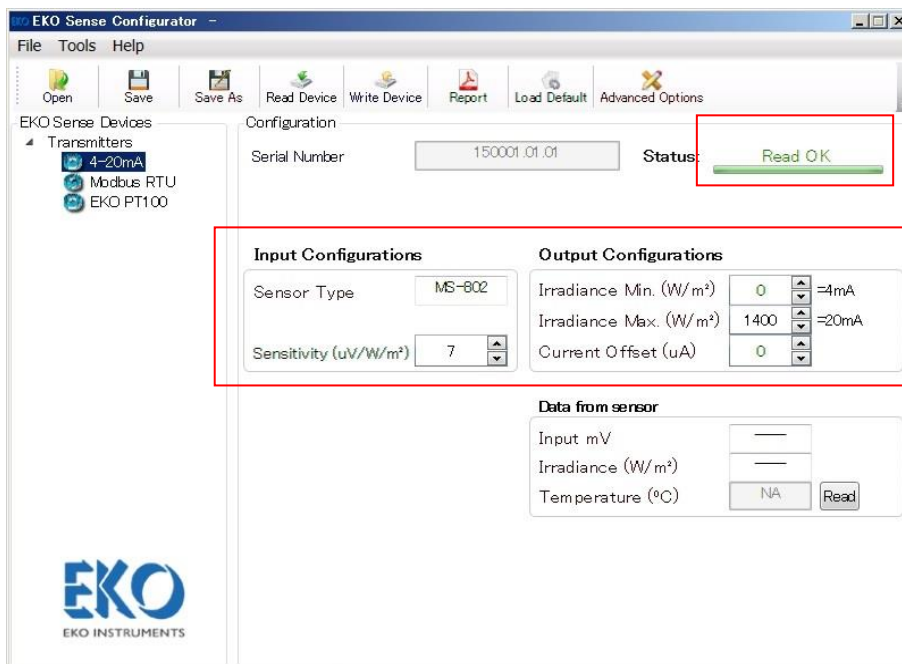


Figure A-12. Configuration Change Window

- e. When “Write Device” button is clicked, confirmation window appears; click [Yes] button to start loading the configuration in the Signal Converter. When it is indicated as the “Write OK”, the configuration is complete.

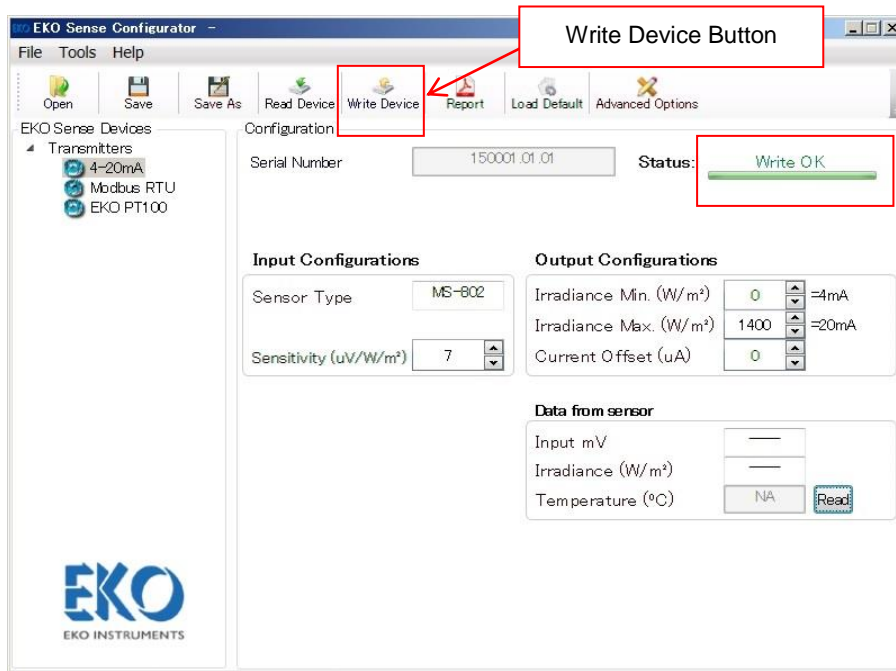


Figure A-13. Write Device Button

5) Saving and Loading the Configuration in Signal Converter

- a. To save the configuration in a file, click [Save as] button on the tool bar at the top configuration window; select the destination and enter the file name then save the configuration. The file is in XML format. To overwrite the changes on a file already exists, click [Save] button.
- b. When there is already saved file available, this file can be loaded. Click [Open] button and select the XML file. The loaded configurations will be shown on the configuration window.

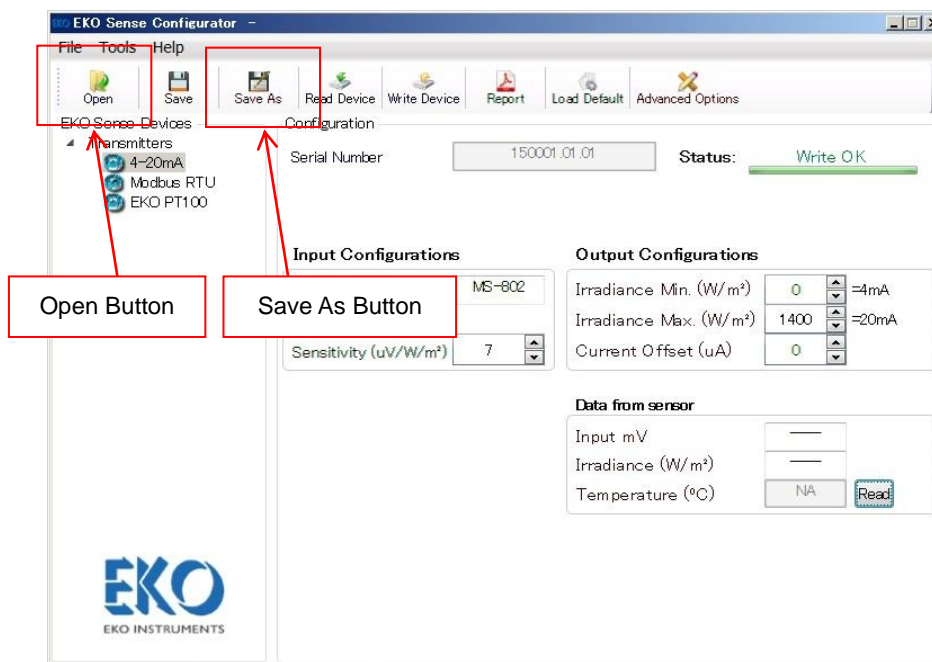


Figure A-14. Save and Load Configuration

6) Creating PDF Report with Signal Converter Configurations

To create PDF file with configuration information, click [Report] button on the tool bar at the top of configuration window. Select the destination and enter file name to save the configuration.

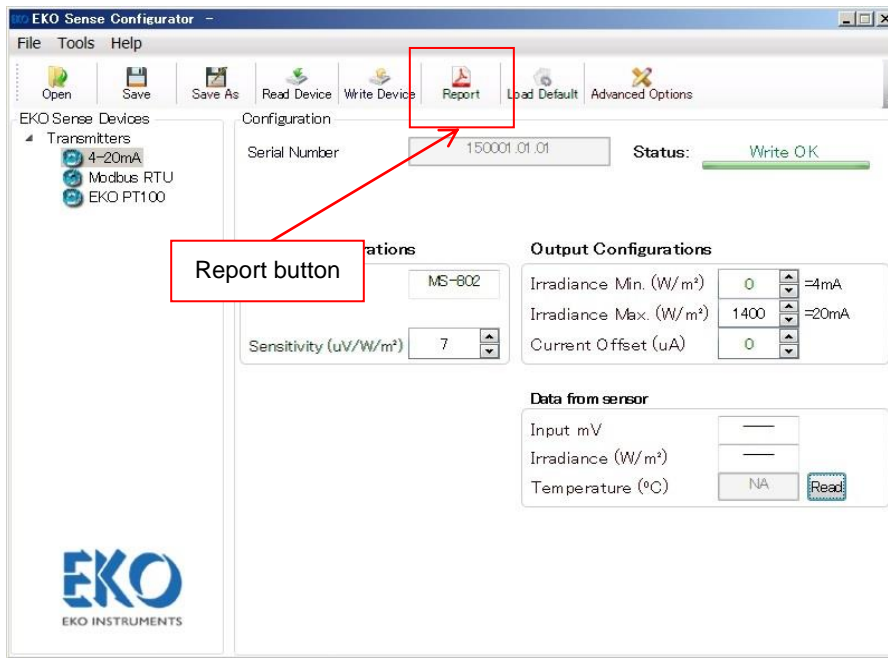


Figure A-15. Output Configurations on Report

7) Advanced Optional Settings

Temperature correction and linearity correction functions can be used.

Click [Advanced Option] button. Temperature correction and linearity correction functions can be setup by entering the following password: eko2014

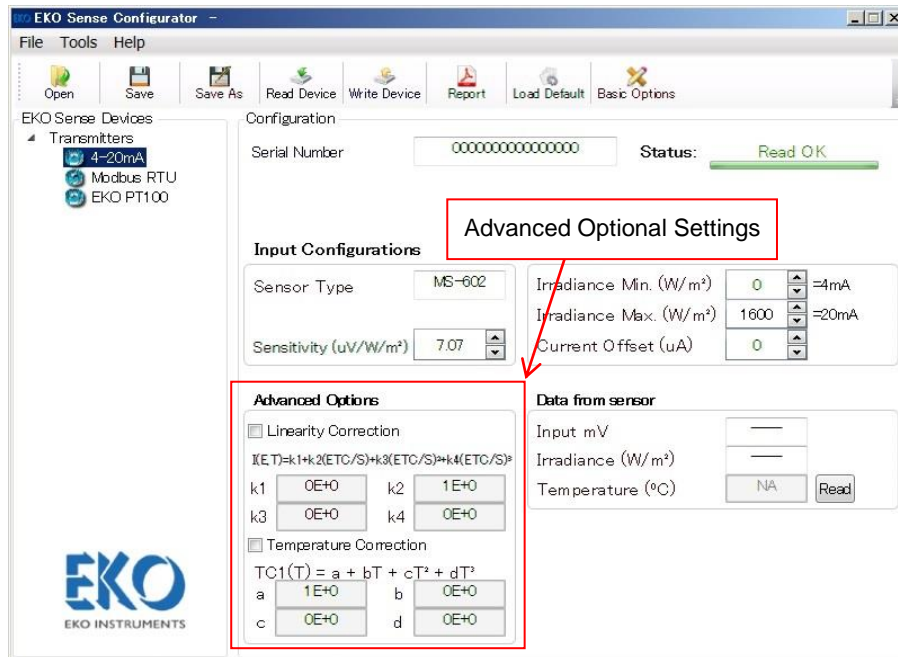


Figure A-16. Advanced Optional Settings

Placing a check on the temperature correction checkbox shown on the window, below calculation becomes effective. If the checkbox is unchecked, the temperature correction calculation will not be applied.

The following formula is used for temperature correction:

$$ETC(E, T) = E / TC1(T)$$

$$TC1(T) = a + b \times T + c \times T^2 + d \times T^3$$

Where:

- ETC (E, T): Measurement Voltage after Temperature Correction
- E : Pyranometer Voltage Signal
- TC1 (T): Temperature Correction Efficient
- T : NTC Thermistor Measurement Temperature (See below figure)
- a, b, c, d : Parameters for Temperature Correction Efficient

Initial settings are as follows; these settings are the same as when the correction function is not used:

a: 1, b: 0, c: 0, d: 0

When applying the temperature correction function using pyranometer with NTC Thermistor (44031, 10kΩ) output wire, connect this output wire to terminals No. 3 and No.4.

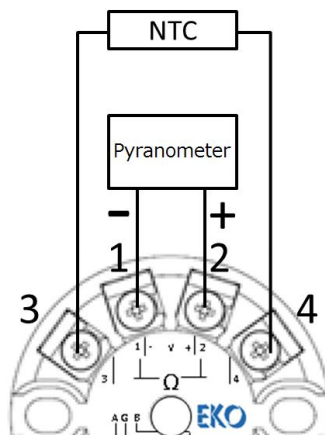


Figure A-17. NTC Connection

Placing a check on the linearity correction checkbox shown on the window, below calculation becomes effective. If the checkbox is unchecked, the linearity correction calculation will not be applied.

The following formula is used for linearity correction:

$$I = (k1 + (k2 \times ETC(E, T) + (k3 \times ETC(E, T)^2) + (k4 \times ETC(E, T)^3)) / S$$

Where:

- I : Irradiance after Linearity Correction
- ETC (E, T) : Measurement Voltage after temperature correction mentioned above
- S : Pyranometer Sensitivity
- k1, k2, k3, k4 : Linearity Correction Coefficient

Initial settings are as follows; these settings are the same as when the correction function is not used:

k1: 0, k2: 1, k3: 0, k4: 0

8) Changing to the Factory Default Configuration

By clicking the [Load Default] button, the configuration at the time of shipment is loaded on the Signal Converter. The default configuration is setup as followings:

NOTE: Default setting will be loaded by just one click.

Basic Configuration

- Serial No.: 0000000000000000
- Pyranometer Model No.: MS-602
- Sensitivity 7.07
- Minimum Irradiance: 0
- Maximum Irradiance: 1600
- Offset Value: 0

Optional Configurations:

Linearity Correction

- k1: 1
- k2: 0
- k3: 0
- k4: 0

Temperature Correction

- a: 0
- b: 1
- c: 0
- d: 0

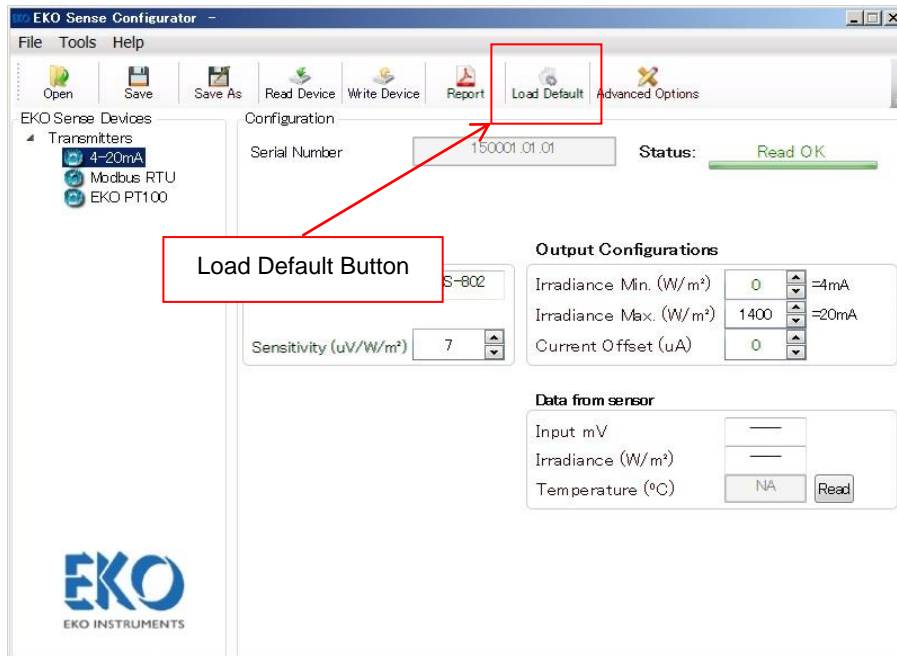


Figure A-18.Factory Default Setting

3. Signal Converter Box

When MC-11 must be used in outdoor environment, optional metallic waterproof boxes with IP65 are available. There are converter box for 1 unit of Signal Converter (Converter Box 1) and box for 2 units of Signal Converters (Converter Box 2), which you can select to meet your needs. There are 3 cable glands (for running cables through the side of box) provided on the Signal Converter Box 1, and 4 cable glands on the Signal Converter Box 2.

Table A-4. Signal Converter Box Specifications

| Items | Signal Converter Box 1 | Signal Converter Box 2 |
|---|------------------------|------------------------|
| Number of Signal Converter Units in Converter Box | 1 unit | 2 units |
| Number of Cable Glands | 3 | 4 |
| Applicable Cable Diameter | φ3 to 7mm | φ3 to 7mm |
| Material | Aluminum | Aluminum |
| Environmental Protection | IP65 | IP65 |
| Dimensions | 90 x 90 x 60 (mm) | 100x140x70 (mm) |
| Weight | 465g | 705g |

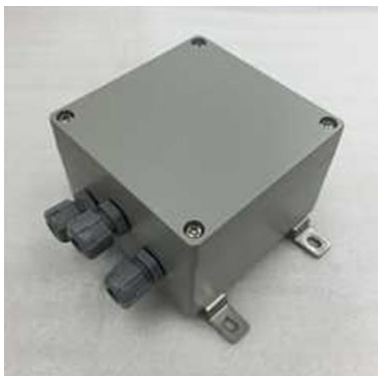






Figure A-19. Converter Box 1



Figure A-20. Converter Box 2

Table A-5. Packaging Contents

| Signal Converter Box1 | | | Signal Converter Box2 | | |
|-----------------------|------|---|-----------------------|------|---|
| Items | Qty | Remarks | Items | Qty | Remarks |
| Converter Box1 | 1pc | For 1 converter | Converter Box2 | 1pc | For 2 converters |
| M4 Screws | 4pcs | For Mounting Feet | M4 Screws | 4pcs | For Mounting Feet |
| Mounting Feet | 4pcs |  | Mounting Feet | 4pcs |  |
| Blind Bar | 3pcs |  | Blind Bar | 4pcs |  |

1) Wiring

Open the box lid and use attached M4 screws (20mm length) to fix the Signal Converter inside the Converter Box as shown below Figure A-21 (Maximum torque for screw is $0.4N \cdot m$).

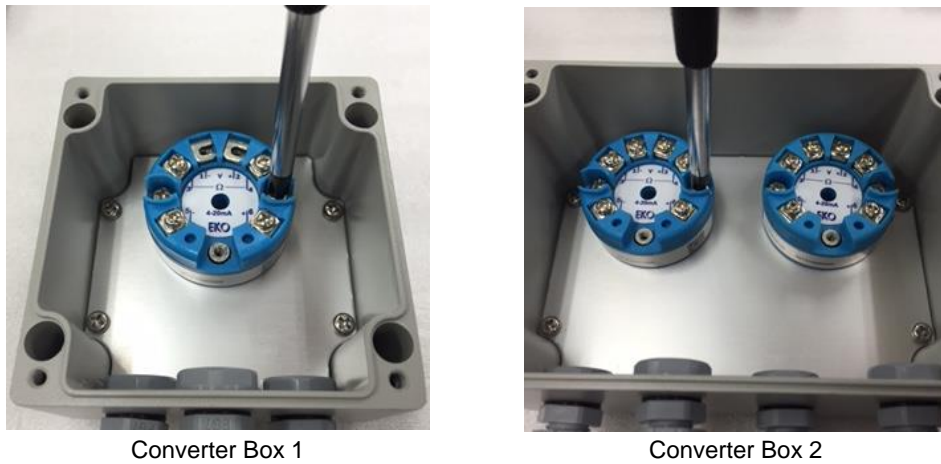


Figure A-21 Installing inside the Converter box

Refer to Figure A-22 for wiring the Signal Converter.

Run the sensor cable, power supply cable and communication cable through the cable glands and connect them to the Signal Converter then close the cable gland cover securely. For the cable glands not used, insert the attached Blind Bar instead of cable then close the cable gland cover securely.

If Blind Bar is not used and/or cable gland cover is not securely closed, water may enter inside the Converter Box and lead to malfunctions of Signal Converters and electrical leakage.

Measurement instrument and grounding line of the power supply should be connected to one of the screws fixed on the base plate.

Connect the ground cable for the sensor and power supply to one of the screw holding the baseplate. Moreover, the bottom surface shape of the Converter Box 1 and the shape of waterproof packing differ, so make sure to check the direction of each part when fitting the lid.

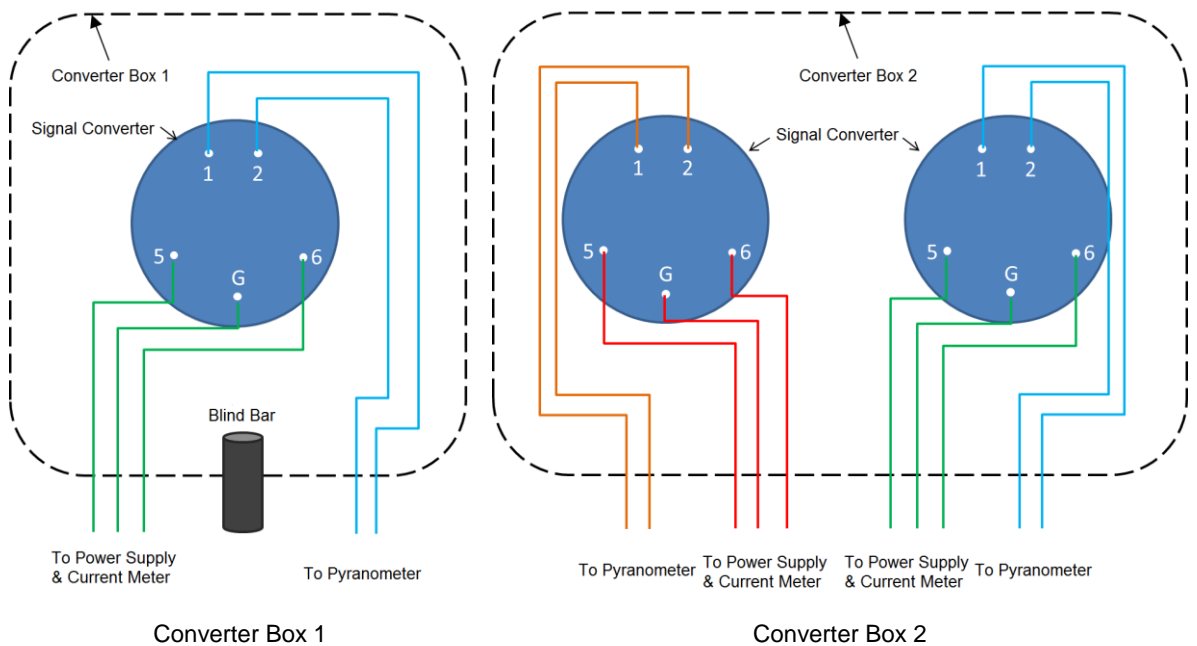


Figure A-22 Wiring Example of Converter Boxes

2) Dimensions

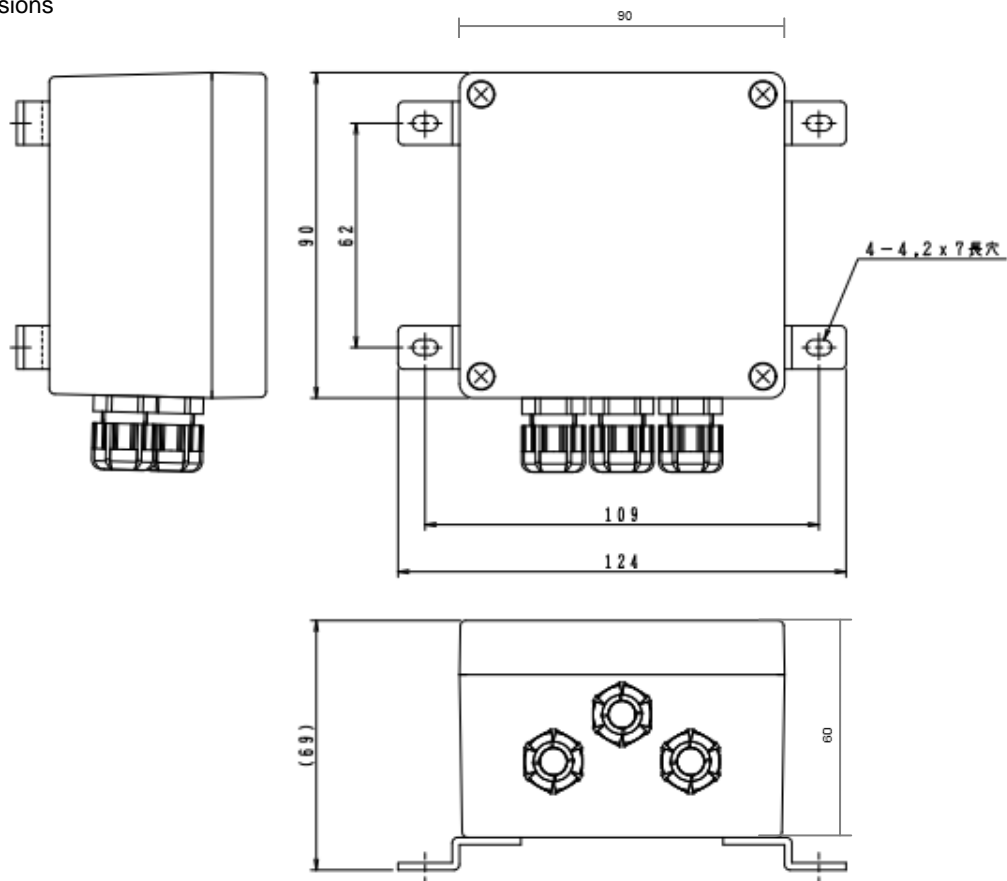


Figure A-23. Converter Box 1

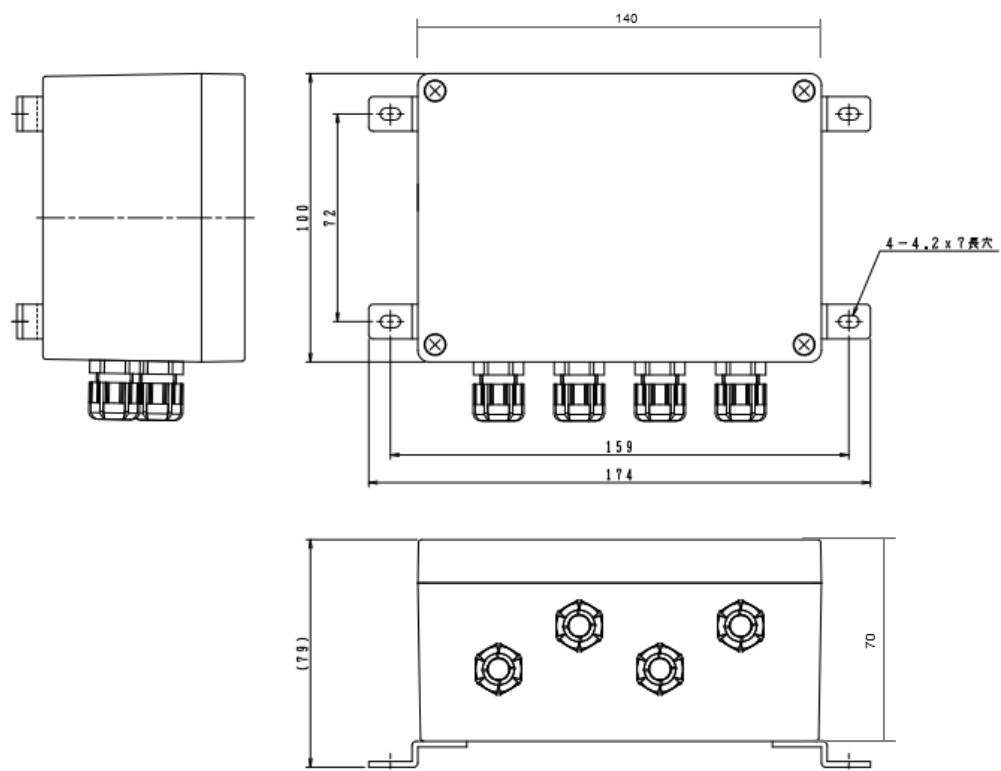


Figure A-24. Converter Box 2

3) Installation

When installing the Converter Box, use the attached mounting feet and M4 screws for fixing..
The installation feet hole pitches are as provided in Table A-6.

Table A-6. Mounting Feet Installation Pitch

| Items | Left & Right Hole Pitch | Top & Bottom Hole Pitch |
|----------------|-------------------------|-------------------------|
| Converter Box1 | 109mm | 62mm |
| Converter Box2 | 159mm | 72mm |



Japan: www.eko.co.jp

Europe: www.eko-eu.com

USA: www.eko-usa.com