

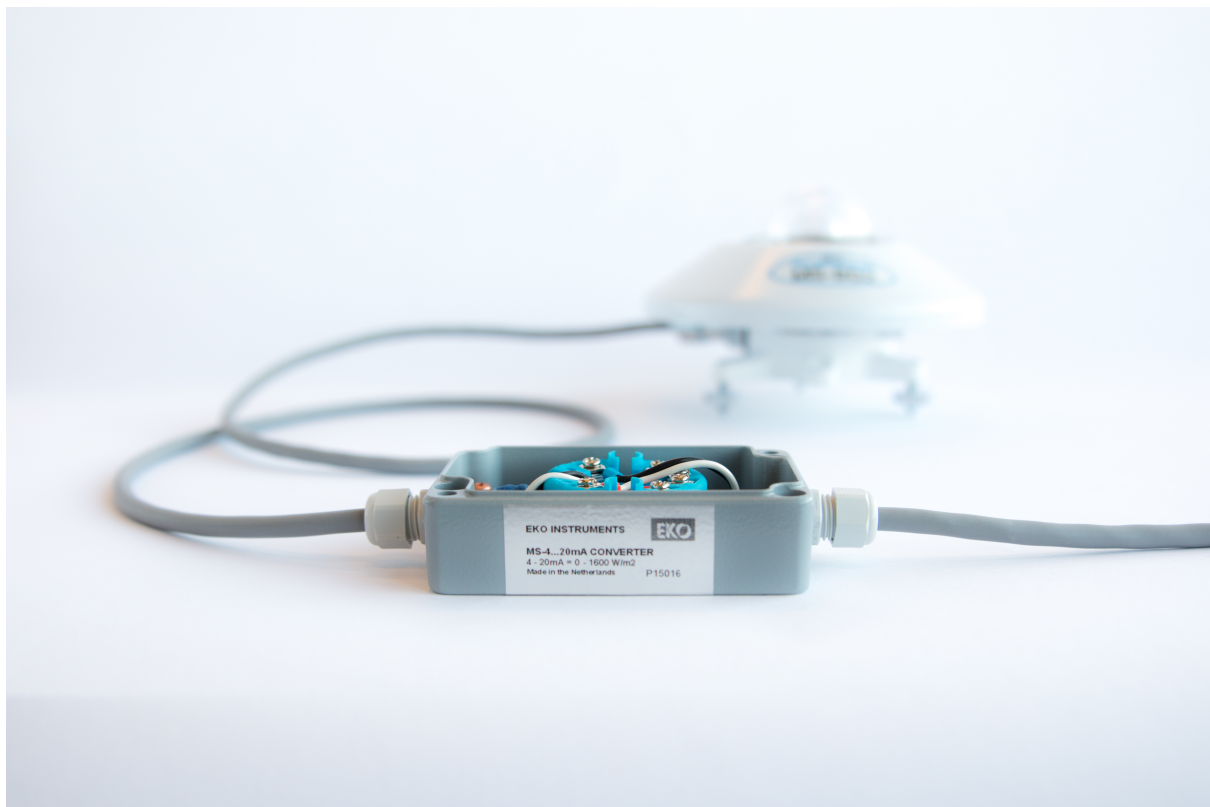


INSTRUCTION MANUAL

4-20mA Converter

A-Box

Version Number: 1



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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

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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: 2015/03/15
Version Number: 1

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

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

Harmonized standards:

EN 61326-1:2006 Class A (Emission)

EN 61326-1:2006 (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: 89/336/EEC

Amendment to the above directive: 93/68/EEC

Date: Mar. 6, 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.



HIGH VOLTAGE WARNING

High voltage is used; pay special attention to instructions given on this instruction manual with this sign to prevent electric leakage and/or electric shocks.



3-1. WARNING/CAUTION

1. Setup

- Do not install 4-20mA Converter in a place, which may get wet or soaked in water.



3-2. HIGH VOLTAGE WARNING

1. Power Supply

- Always check the DC voltage for the specified supply power before connecting the 4-20mA Converter (12 – 24 VDC).

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
Signal Converter	1 unit	Accommodated in Aluminium box
Grounding Terminal	1 pc.	
Grounding Terminal	4pc.	
Quick Start Guide	1	

Optional Items	Qty.	Remarks
USB Controller	1 unit	
Connecting cable	1 pc.	1m with clamps
Software	1pc.	On USB memory stick
Quick Start Guide	1	

5. Getting Started

5-1. Parts Name

Each part name and its main functions are described below.

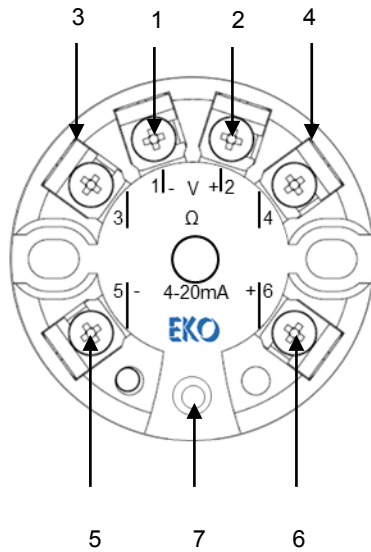


Figure 5-1. Parts Name

Table 5-1. Parts Name and Terminal Numbers

Parts Name		Terminal Numbers
1	Pyranometer Signal Input Terminal (-)	1
2	Pyranometer Signal Input Terminal (+)	2
3	Temperature sensor (NTC 10kΩ)	3
4	Temperature sensor (NTC 10kΩ)	4
5	4-20mA Output & Power Supply Input Terminal (-)	5
6	4-20mA Output & Power Supply Input Terminal (+)	6
7	Ground terminal	N/A

5-2. Setup

1. Installation

After installation of the solar sensor the 4-20mA Converter can be installed. Open the enclosure of the 4-20mA Converter by releasing the 4 top screws. Guide the sensor cable through the cable gland and secure the cable gland to secure and seal the cable.



Note: In industrial environments to reduce potential EMI effects, the cable between sensor and converter need to be short (<1m).



Note: Make sure that the power supply or current loop measurement device is switched off during installation of the sensor output cable.

2. Electrical connection

(Input) Connect the sensor terminals to the input terminal of the 4...20mA converter as shown in the wiring diagram below. For EKO pyranometers the Red terminal is connected to the (+ terminal 2) and the Blue terminal to the (- terminal 1) of the converter input. The cable shield must be connected to the aluminium housing by using the copper screw attached.

(Output) Guide the 2 wires output cable through the cable gland and secure the cable gland to seal the cable. Connect the two wires to the output terminals of the converter (Voltage to + terminal 6 and return wire to – terminal 5) and mount the cable shield to the aluminium housing by using the copper screws.

Mount the cover onto the enclosure and secure it with the 4 screws firmly. The 4-20mA converter is now ready to be used. For proper operation one should apply a supply voltage in the range as specified. The minimum required supply voltage is 12 VDC, which is needed to feed the internal electronics. In case of very long cables the voltage loss across the cable must be compensated (24 VDC supply voltage recommended).

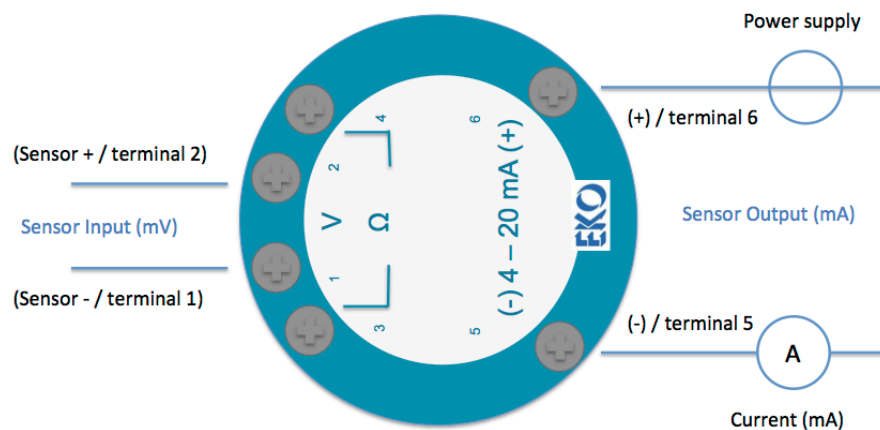
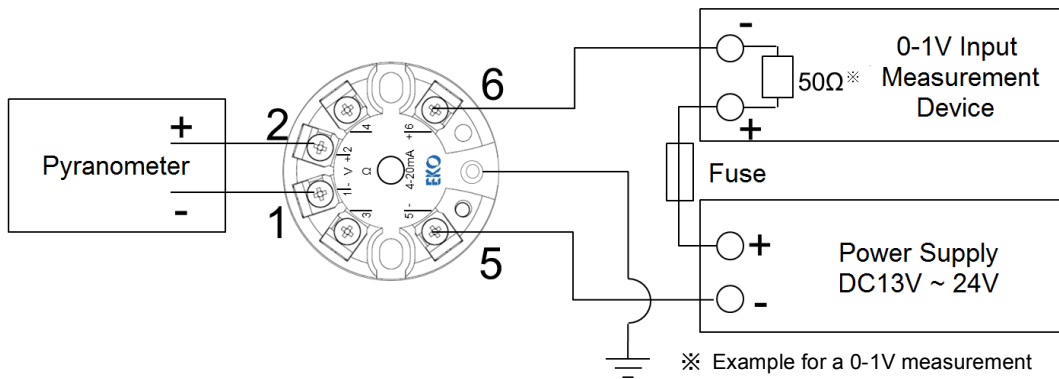
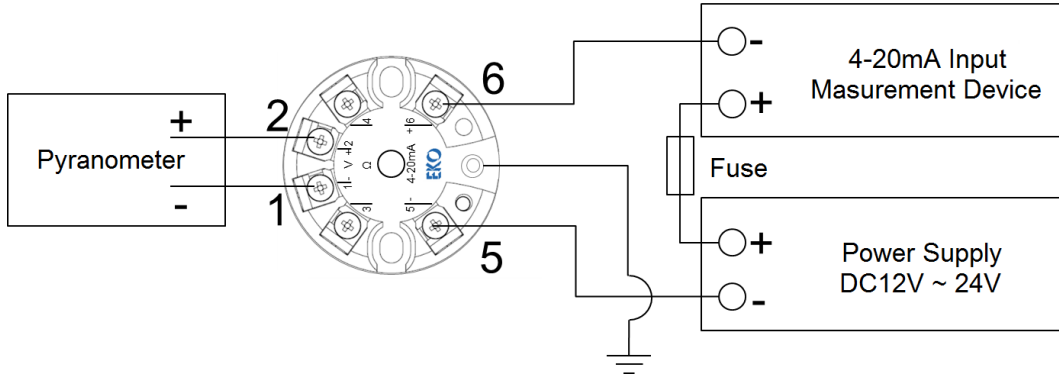


Figure 5-2. Wiring current output (4-20mA)

Wiring with fuse protection

Even though the output terminals are protected against surge a fuse can be applied in addition.



※ Example for a 0-1V measurement device and 50Ω precision shunt resistance.

Figure 5-3. Wiring Voltage output (0.2 – 1V)

5-3. Measurement

1. Calculation of Solar Irradiance from Current Output

Current conversion

Only for pre-set solar sensitivity values (4-20 mA = 0 – 1600 W/m²).

To convert the mA output signal into the measurement unit [W/m²] the following formula has to be used:

$$I = (I_{out} - 4mA) \times 100$$

Where:

I = Solar Irradiance [W/m²]

I_{out} = Measured Current [mA]

Voltage conversion

Only for pre-set solar sensitivity values (4-20 mA = 0 – 1600 W/m²).

Measure the voltage across the precision shunt resistor, which is connected in series with the 4-20mA output cable. To convert the V output signal into the measurement unit [W/m²] the following formula has to be used:

$$I = (V / R * 1000 - 4mA) \times 100$$

Where:

I = Solar Irradiance [W/m²]

V = Measured Voltage [V]

R = Precision Shunt Resistance [Ω]

Example:

- a) When 50Ω resistance is used, the voltage at the both ends of the shunt resistance would be 200mV to 1V, and it is equivalent to 0 to 1600W/m²
- b) When 500Ω resistance is used, the voltage at the both ends of the shunt resistance would be 2V to 10V, and it is equivalent to 0 to 1600W/m²

6. USB Controller / Software

6-1. EKO Sense Configurator software

EKO Sense configurator software is a generic configurator tool for all EKO sensor converters, which works in combination with the EKO SENSE 4-20mA USB Controller. It is used to change settings to the sensor input and output range or check the functionality of the solar sensor. The USB controller is a digital PC communication interface and provides power to the 4-20mA converter.

6-2. Installation

Install the Windows software (executable file) provided on the EKO USB memory stick. After installation the software can be used when the EKO Sensor USB controller is connected to the PC.

In the menu options Tools/languages different languages can be selected (English, Spanish, Portuguese, Japanese).

6-3. Electrical connection

Connect the USB controller to a PC and connect the red (+) and black clamp (-) to the output to the sensor output of the 4-20mA Converter. Power will be supplied from the USB port.

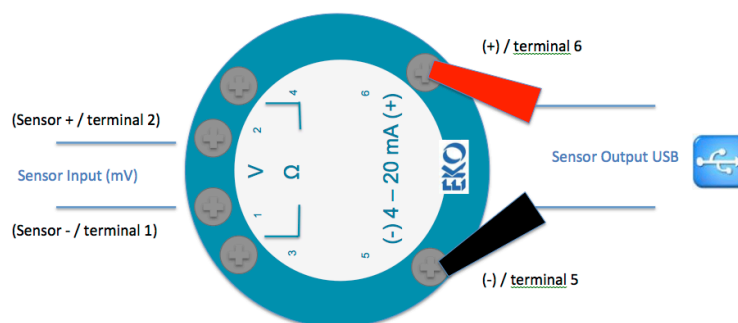
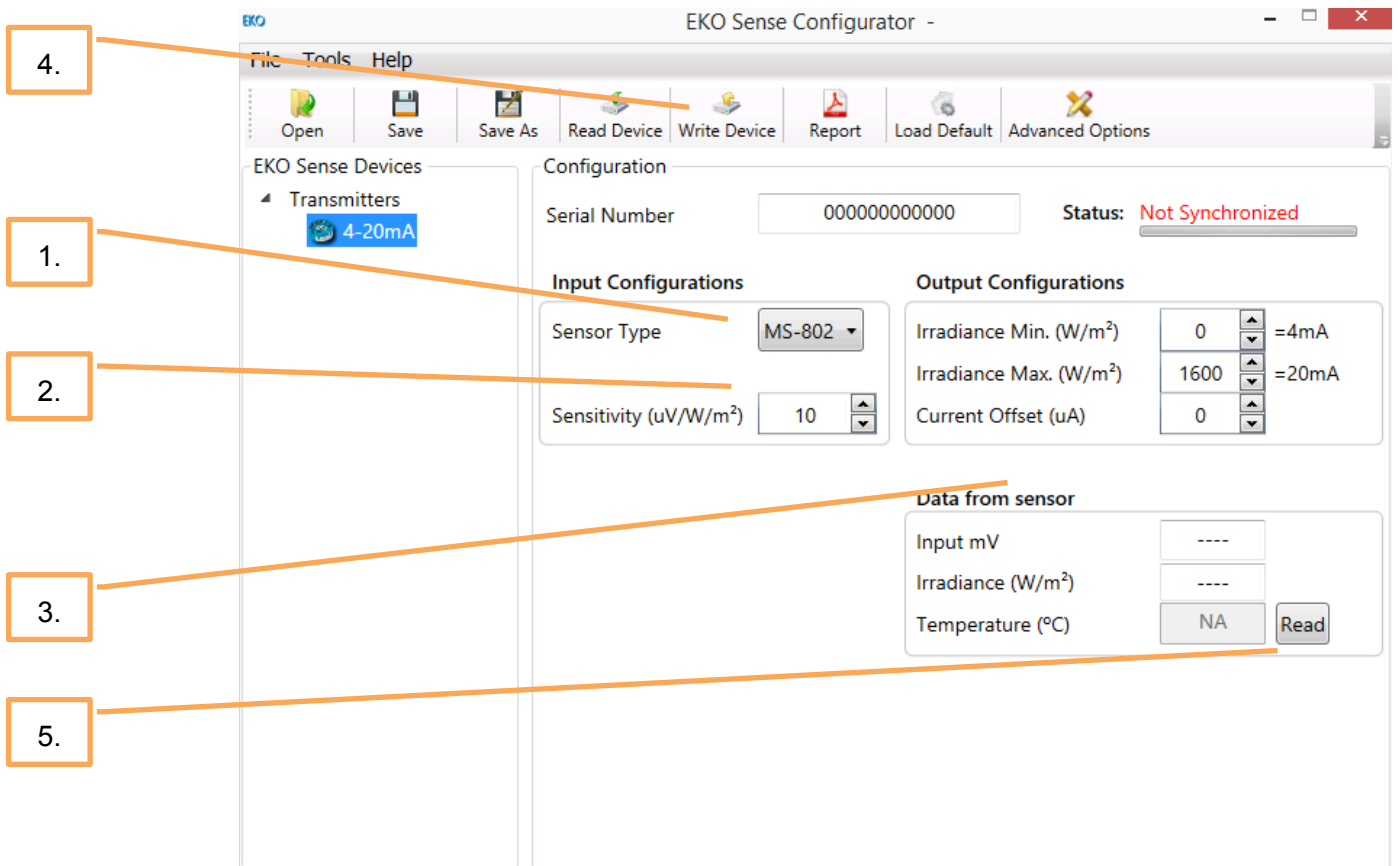


Figure 5-3. Wiring USB Controller)

6-4. Operating

Select the transmitter type and the USB controller will automatically detect the transmitter within 5s. When the transmitter can't be found, go to [Tools/Search and connect](#) and re-connect the transmitter again. The serial port settings of the USB controller can be verified at [Tools/Serial Port Configuration](#).

The Software has several functions explained in the next paragraph. It gives a number of standard functions to open / save settings or make a report of the setting applied.



Change settings

1. Select Sensor type
2. Set sensitivity (Sensor calibration written on the serial number label or calibration certificate)
3. Set Irradiance / mA output range
4. Write device.

Note: when changes are made, write new settings to device. When the setting file is uploaded, the settings will remain, even when the power is switched of.

5. Sensor output can be tested through the [Read](#) function (mV, Irradiance W/m^2 , temperature (Only when a temperature sensor (NTC 10k Ω) is connected)).

Setting files can be saved ([Save](#)) or printed ([Report](#)).

7. Troubleshooting

7-1. Troubleshooting

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

Table 7-1. Troubleshooting 4-20mA Converter

Failure	Action
There is no output from the signal converter.	Check the output cable connection, and make sure there are no disconnections. Check to make sure that DC12~24V of power supply voltage is supplied.
Output value from the signal converter is not appropriate.	Check the input cable connection, and make sure there are no disconnections.
The convert output is more than 20mA.	Make sure the input signal voltage is less than $1600W/m^2$, which is calculated with the solar sensor sensitivity.
The converter output is less than 4mA.	Check whether the + and – wirings are connected in reverse polarity. NOTE: During nighttime conditions a negative voltage can be detected known as the sensor zero-offset A effect (Only thermopile pyranometers).
Signal converter output is unstable.	Check for any loose wire/cable connections.

Table 7-2. Troubleshooting 4-20mA USB Controller

Failure	Action
No connection possible	Check the connection. The 4-20mA converter can only be found during a short period after connection. Re-insert the USB controller, or reconnect the Jack plug, or reconnect the red clamp.
No change to made to converter settings	Settings will only be active after writing the new settings. When changes are made to the settings menu the status field will indicate (Synchronized or Not Synchronized)
Read function doesn't display any measured data	Check the connection

8. Specifications

8-1. Main Unit

Table 8-1. Main Unit 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 Humidity Range	< 95RH% (no condensation)
Response Time	1sec. (99% Output)
Non-Linearity	< 0.1% (0-100mV)
Zero Offset	<5 μ V (Output offset value when 0mV at input @ 500 Ω)
Power Supply Voltage Conversion Error	<0.05% (When supply voltage changed from 12V to 24V)
Power Supply	DC 12~24 V \pm 20%
Power Consumption	0.08~0.75W
Dimension	ϕ 45 x 23mm
Weight	0,24 kg
Aluminium box	IP 65
	Dimensions 64 x 98 x 36 / Cable gland M12 (ϕ 3-6mm)

8-2. USB Controller and configurator software

Table 8-2. USB Controller

USB Controller / EKO Sense software	Windows 7, 8
Weight	0,05 kg
Cable	1m / gator clamps

8-3. Dimensions

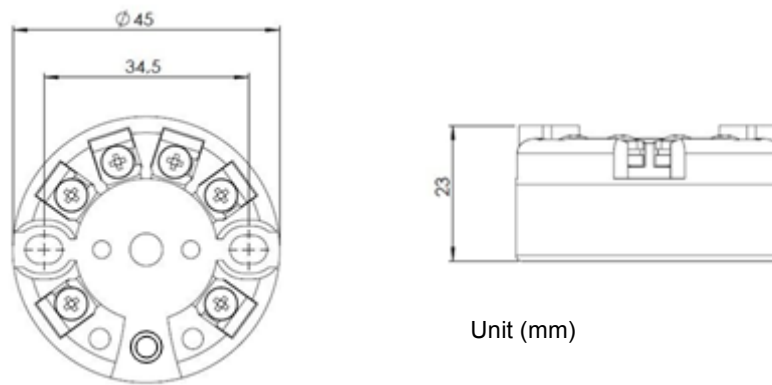


Figure 8-1. Dimensions

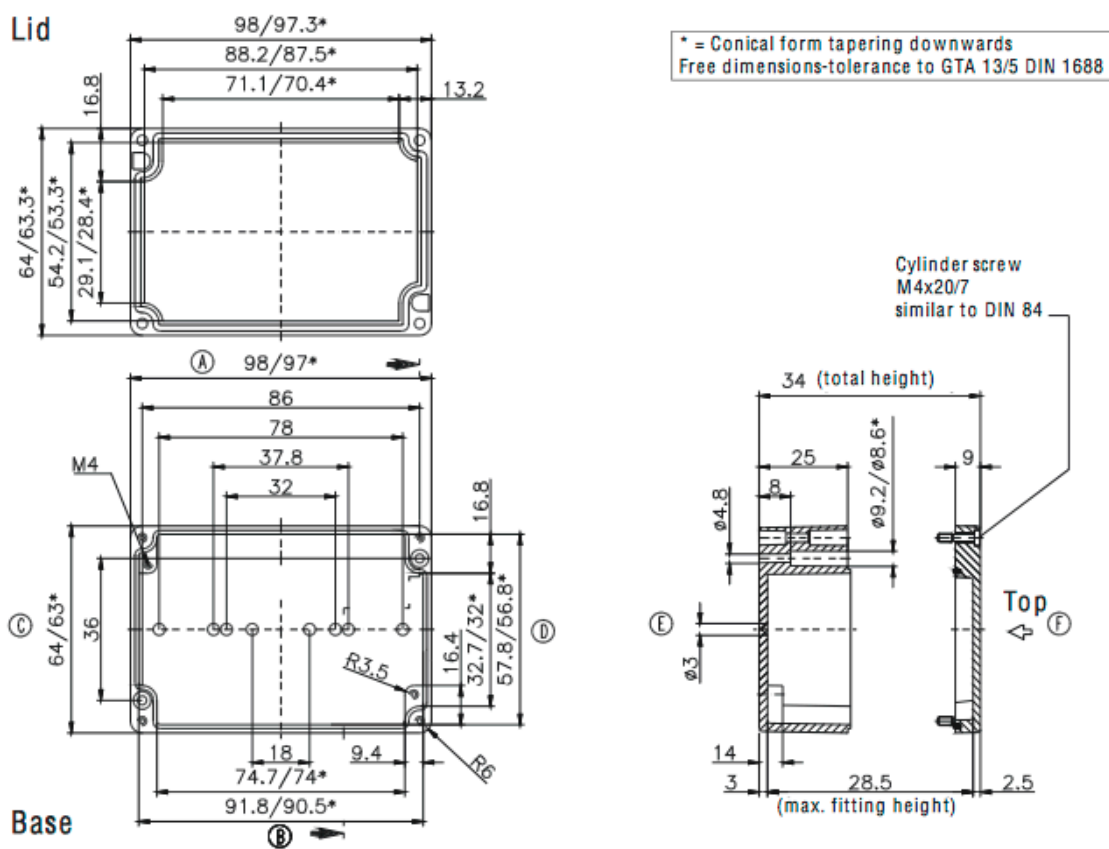


Figure 8-2. Box Dimensions



Japan: www.eko.co.jp

Europe: www.eko-eu.com

USA: www.eko-usa.com