# CD-700(CO2) Transmitter Datasheet

## (CO2 Carbon Dioxide, RS-485Modbus)

## General

The CD-700(CO2) transmitter can measure NDIR CO2 concentration, temperature, and humidity. CO2 ventilation and temperature control can be controlled through up to two relays.
For customer convenience, various outputs such as RS-485Modbus communication and analog voltage/current are optional supported.
This product is a world-class, highly reliable product made by ELT SENSOR technology, a company specializing in gas sensors with 20 years of experience.
This CD-700 series has a variety of products equipped with not only a CO2 sensor but also more than 10 types of environmental gas and dust sensors. (CxHy, CO2, H2S, NH3, NO2, NO, SO2, H2, O3, PM, etc.)
It is very convenient to use because it can measure, manage, and control complex gases by connecting various types of sensors in the same CD-700 format.

**CD-700(CO2)**
**Without LCD-Display**

**CD-700(CO2)**
**(with LCD Option)**

## Application fields

Smart cities, smart buildings, various industrial fields, underground parking lots, trains, agricultural fields, etc.

Gas leak detection, gas safety management (asphyxiation, explosion, etc.), environmental monitoring, etc.

## Features

- **Sensor Technologies**
  NDIR CO2 (Non-Dispersive Infrared)- Gold plated optical cavity
  Temperature (RTC) and Humidity sensor (Semiconductor type) – optional order
- **Pre-Calibrated (Concentration, Temperature)**
  Precise gas concentration & temperature calibration,
  Individual inspection of all products before shipment
- **RS-485Modbus Communication (default)**
- **Analog (Voltage/Current) Output (4~20mA/0~10V) - Choice option**
  Should be select only one output option between RS485modbus or Analog output.
- **Re-calibration function**
  Zero only or Zero + Span user calibrations are supported
- **Change of relay value(only LCD option)** : CO2, Temp. relay range is settable with button on Front Cover.
- **Power** : 24V DC, AC.
- **Size**: 123mmx70mmx48mm (130g)

## Ordering Information

- **CD-700(Gas) + Choice OPTION**

| OPTION | ORDER CODE | OPTION SPECIFICATIONS |
|---|---|---|
| **LCD DISPLAY** | **L** | LCD Display |
| **PCB COATING** | **G** | PCB Coating |
| **TEMP & HUMIDITY** | **TH** | Temperature, Humidity sensor |
| **ANALOG OUTPUT** | **A** | Analog Output(Voltage/Current) |
| **RELAYS** | **R** | Relays |
| **BUZZER** | **B** | Buzzer |

※ Example : CO2, LCD Display & Buzzer -> **CD-700(CO2)+L+B**

※ Notice : If you are a first-time purchaser, please send an email to our sales team to confirm the required specifications and we will contact you to confirm. (sales@eltsensor.co.kr)

## Detailed Technical Specifications

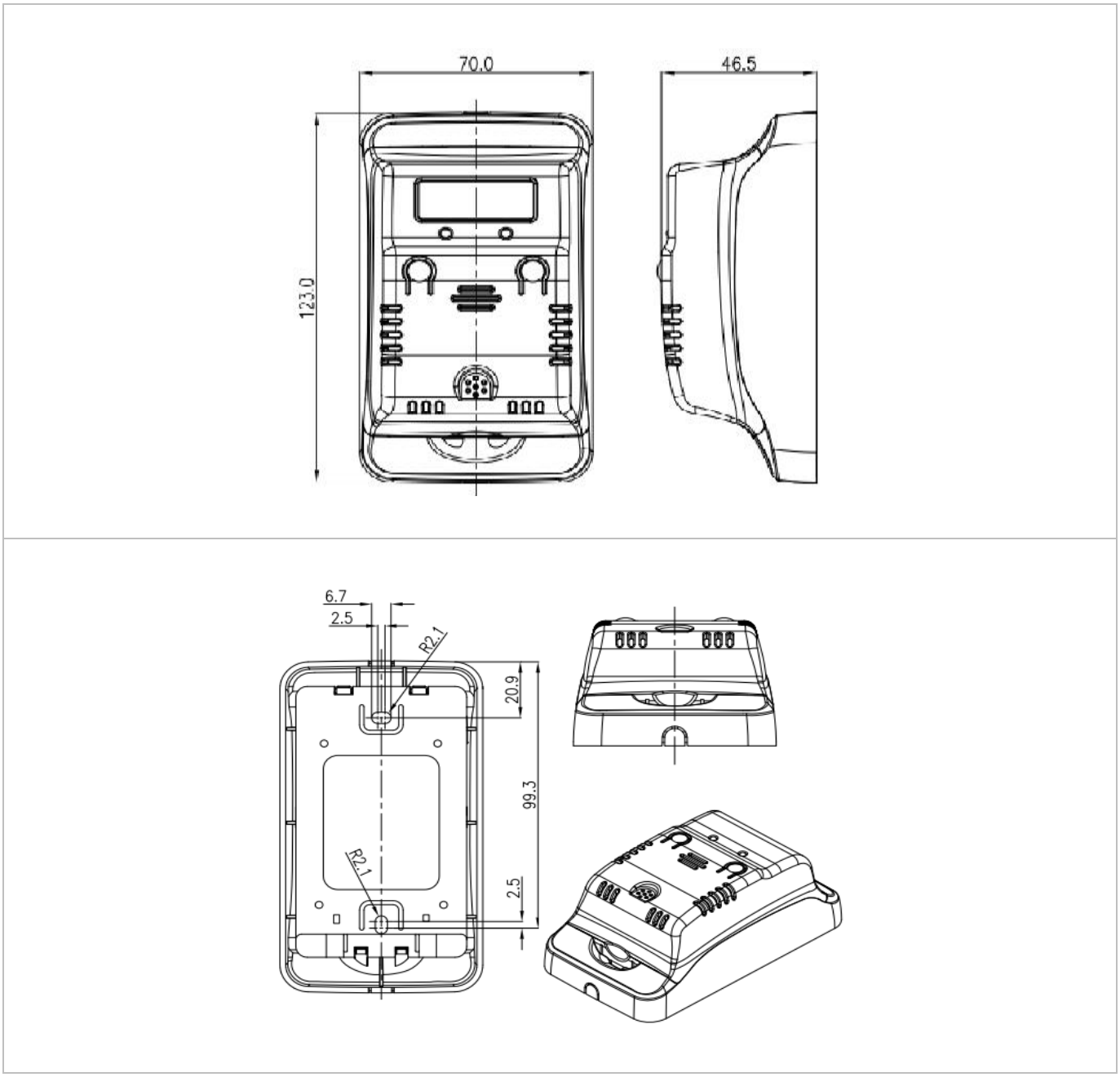
| OPERATING ENVIRONMENT | |
|---|---|
| **TEMPERATURE RANGE** | -20℃ ~ 60℃ |
| **HUMIDITY RANGE** | 0% ~ 95% RH (non-condensing),<br>PCB Coating **'G'** option |
| **PRESSURE RANGE** | 1 ± 0.1 atm |
| **STORAGE TEMP** | 0℃ ~ 20℃ (Storage at low temperatures below 0℃ and high temperatures above 40℃ may shorten lifespan) |
| **EXPECTED LIFE CYCLE** | > 10 years. (CO2 Auto Calibration-ACDL) |

| SENSOR PERFORMANCE | |
|---|---|
| **PRINCIPLE** | CO2 sensor : NDIR<br>Temperature sensor: RTC(Option)<br>Humidity sensor : Semiconductor type(Option) |
| **SENSING RANGE** | CO2 0~10,000ppm (Default)<br>(0~2K, 3K, 5Kppm user selectable with switch on PCB)<br>**※ 0~2%, 3%, 5%, 10% are contact sales Team: sales@eltsensor.co.kr)**<br>Temperature Measurement : -30℃ ~ 70℃<br>Humidity Measurement : 0 ~ 95% R.H |
| **ACCURACY** | **CO2 : 3% ± 50ppm of Reading**<br>(ACDL operation : 3%±30ppm of reading)<br>Temperature : ± 0.5 ℃ (0℃ ~ 40℃), ± 1.0 ℃ Other ranges<br>Humidity : ± 3 % RH (20 ~ 80% RH), ± 5 % Other ranges |
| **RESPONSE TIME** | T63 : ≤ 90 s, T90 : ≤ 150 s (CO2) |
| **RESOLUTION** | 1ppm (0~ 5000ppm) |
| **DETECTION LIMIT** | 5ppm (0~ 5000ppm) |
| **ZERO REPEATABILITY** | ± 10ppm (@25℃, 0ppm) |
| **SPAN REPEATABILITY** | ± 20ppm (@25℃, 1000ppm) |
| **WARMING-UP TIME** | 10 seconds (based on output),<br>3 minutes (based on accuracy) |
| **OUTPUT CYCLES** | 3 second |

## ELECTRICAL DATA (INPUTS AND OUTPUTS)

| | |
|---|---|
| **WORKING VOLTAGE** | 24VAC± 20%, 50/60Hz(4-wired)<br>Or 24VDC ± 20% (3-wired available) |
| **RELAY CONTACT RATINGS** | 1A 120VAC / 1A 24VDC |
| **RS485 MODBUS** | 2 wired Half-Duplex typed Modicon Mod-Bus RTU mode<br>9,600 BPS is default. (38,400 BPS is option) |
| **ANALOG OUTPUT**<br>**(ORDERING OPTIONS)** | 4-20mA (default), 0~20mA or 0/2~10V<br>Only one of RS485 or 4~20mA output can be used |

## Dimensions (unit : mm)



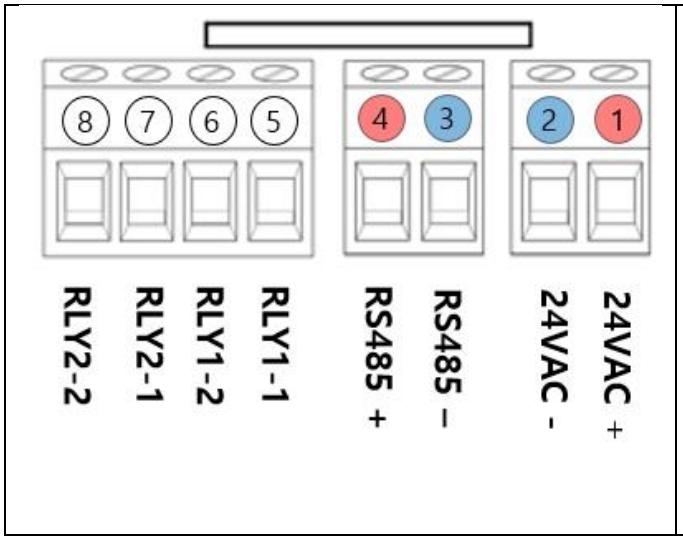

## product packaging

Packaged in 1 paper box including all contents.

Contents : Main body, fixing screws(2pcs, 4x25mm), user operation manual

## Wiring Method for 24VDC, 24VAC with RS-485modbus

**For wired method**, 24VDC/AC+ should be wired into pin-1 24VDC/AC- into pin-2, RS-485 –(B) into pin-3 and RS485 +(A) into pin-4 each (J1)




| | |
|---|---|
| ① | **24VDC/AC +** |
| ② | **24VDC/AC -** |
| ③ | **RS-485 – (B)** |
| ④ | **RS-485 + (A)** |
| ⑤ | Reserved |
| ⑥ | Reserved |
| ⑦ | Reserved |
| ⑧ | Reserved |

## LCD Display (for LCD model, with Temp. Humidity options)

When equipped with a CO2 sensor + temperature and humidity sensor, CD-700 with LCD option displays CO2 (6 seconds), temperature (2 seconds), and humidity (2 seconds) alternately.

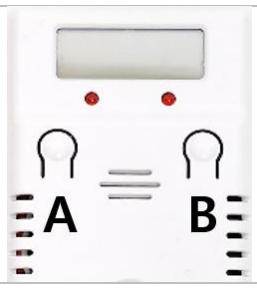

GAS (Max. 5 digit)


Temperature (2 digit)

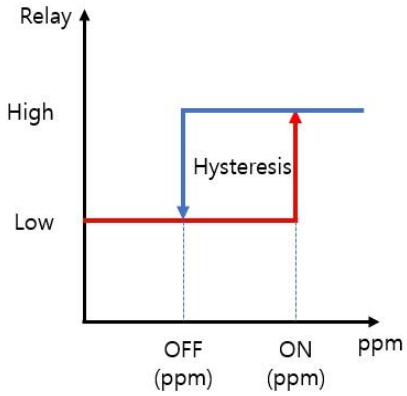

Humidity (2 digit)

## Two relay setting – CO2 Gas, Temperature (for relay option)

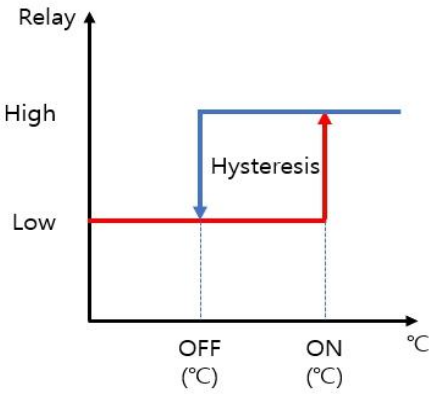
Contract Rating : 1A/120VAC
Relay type: SPST (Single Point Single Throw), Relay Status CO2 : N.O., Temp./Humid. : N.C. is default.
Buzzer-alarm : sounds for 30 seconds whenever the relay status is changed unless stopped by pressing 'B' button.




Cover image



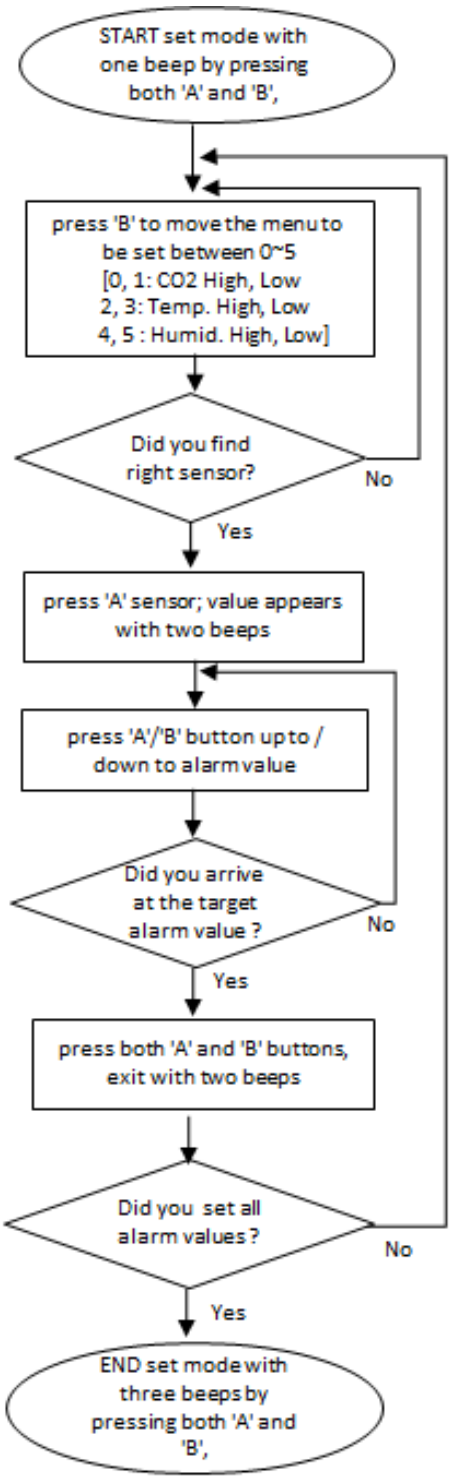

**CO2(ex.100ppm) :** On ≤ 500ppm, Off ≥ 475ppm, N.O. is default, (N,C: Normal Close is optional)




**Temp. :** On ≥ 30℃, Off ≤ 27℃, N.C. is default

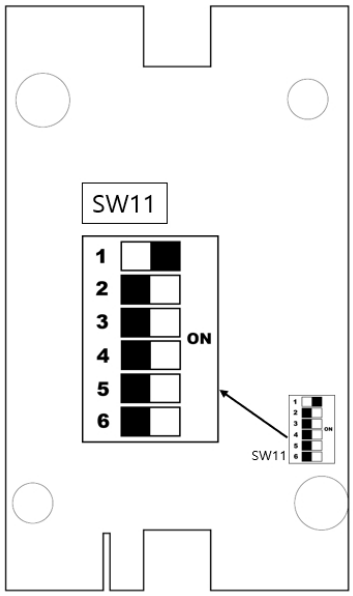
## Alarm & Relays set value change. (for Buzzer option)

Buzzer-alarm get muted with short two beeps when ‘B’ button pressed for 2 seconds, unmuted with a short beep when ‘A’ button is pressed for 2 seconds.
High/Low alarm levels of three kinds sensors, Gas-sensor, Temp., Humid. could be changed by pressing button ‘A’ and ‘B’ through the flow chart below



## RS-485ModBus with Address

To measure and send signal using RS485Modbus, 2 wired Half-Duplex typed Modicon Mod-Bus RTU mode is supported.




DIP Switch (LSB: 1, MSB:6)

| Parameters | Descriptions |
|---|---|
| Baud rate | 9,600 BPS is deafault. (38,400 BPS is option) |
| Data bit | 8 Bits |
| Parity bit | None |
| Stop bit | 1 |

Parameter setting

- Hold Register Specification.
  - Mapping Base Address: 0x0050
  - Hold Register. Max. Read Size: 3
  - Supported Function Code: 3(Read Holding Registers)

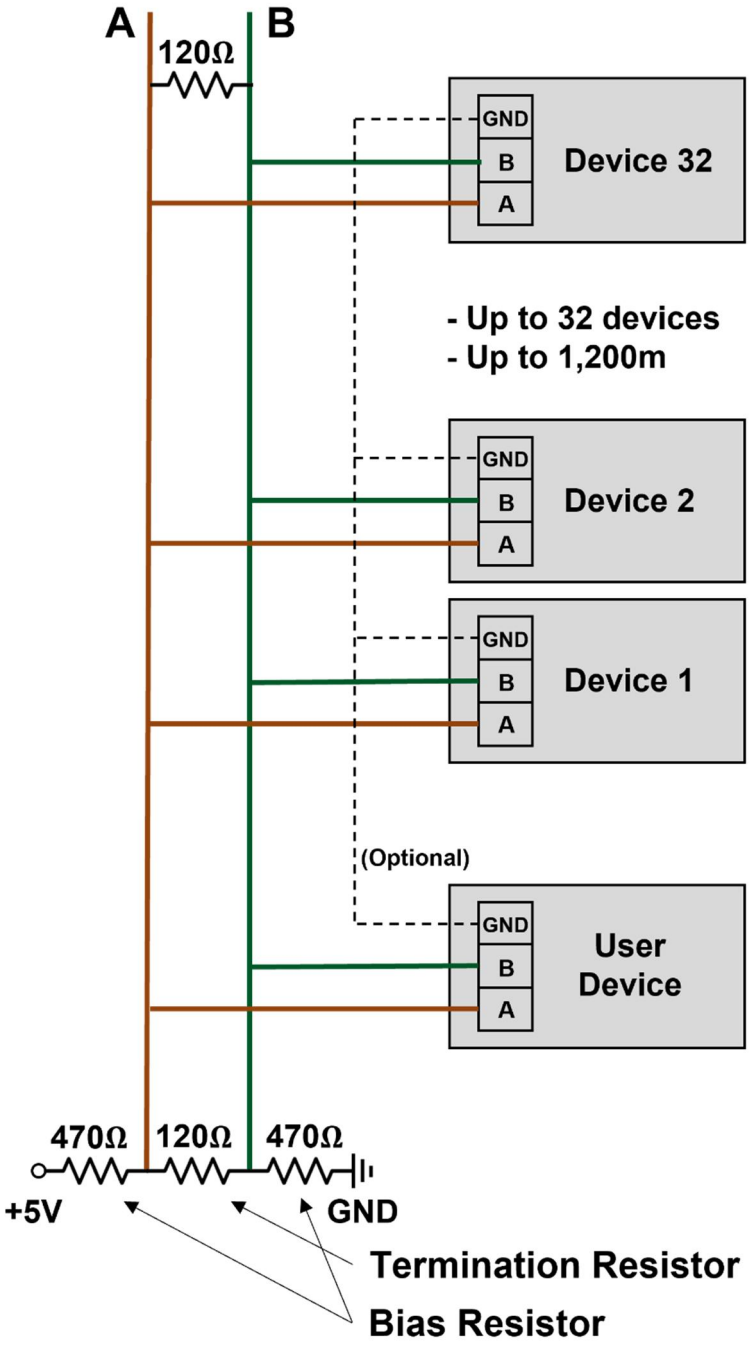
| Addr. | Value | Type | Unit | Output |
|---|---|---|---|---|
| **0x0050** | Gas | Word | PPM | Ex) 1000-> 1,000ppm for CO2 gas |
| **0x0051** | reserved | Int 2Byte | ℃ | reserved |
| **0x0052** | reserved | Word | % | reserved |
| **0x0053** | reserved | Int 2Byte | | reserved |
| **0x0054** | reserved | Int 2Byte | | reserved |
| **0x0055** | Error. | Word | % | Error message |

- Error code definition

| Code | Descriptions |
|---|---|
| **0x00** | No error |
| **0x01** | Gas error |
| **0x02** | reserved |
| **0x04** | reserved |

- Termination Resistor and Bias Resistor should be used as needed.

RS-485 BUS

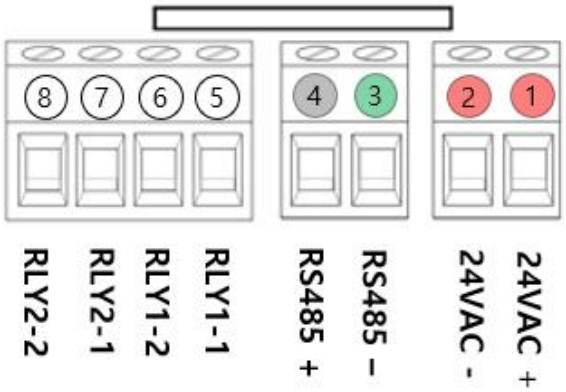


## Output choice

Analog out output and RS485modbus output cannot be used simultaneously because they use the same output terminal.

### [J1] Wiring Method for 24VDC, 24VAC, Analog Output (for analog output option)

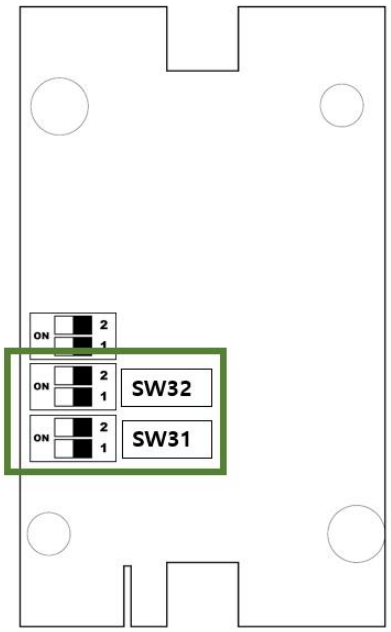
**For wired method,** 24VDC/AC + should be wired into pin-1, 24VDC/AC - & Aout - & GND into pin-2, Aout + for Gas pin-3 and Aout + for Temp(option) into pin-4 each (J1)



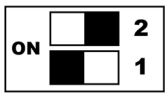

| | |
|---|---|
| ① | **24VDC/AC +** |
| ② | **24VDC/AC - & Aout -** |
| ③ | **Aout + for Gas** |
| ④ | **Aout + for Temp(option)** |
| ⑤ | Reserved |
| ⑥ | Reserved |
| ⑦ | Reserved |
| ⑧ | Reserved |

## Analog output selection

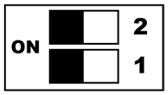
■ SW32(CO2), SW31(Temp) : 4 ~ 20mA, 2 ~ 10V, 0~20mA, 0~10V. setting
Note : RS485Modbus communication is default and analog current of 4/0~20mA or analog voltage 2/0~10V or 1/0~5V could be chosen as option on issuing order.



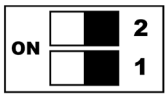

4~20mA



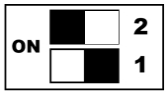

2~10V




0~20mA

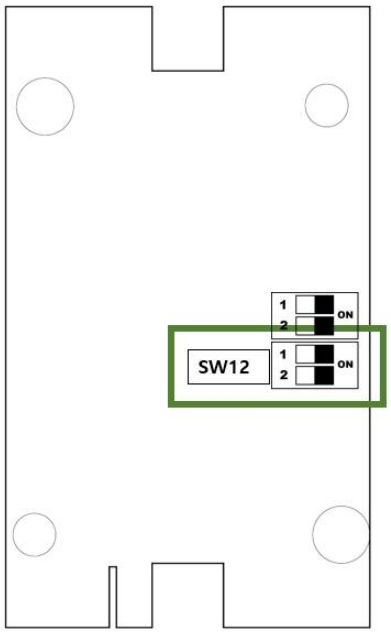



0~10V

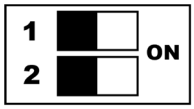



## Reading range selection of CO2 Gas. (CO2 only)

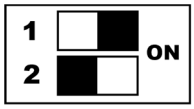
■ SW12 : 0~10k ppm default for CO2 gas, changeable with switch in the field with power off



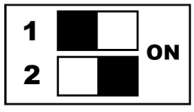

0 ~ 2,000ppm



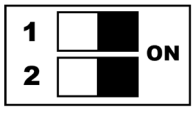

0 ~ 3,000ppm




0~5,000ppm




0 ~ 10,000ppm



## Operation Mode Selection with MCDL and ACDL (for CO2)

■ **J15** : Calibration selection

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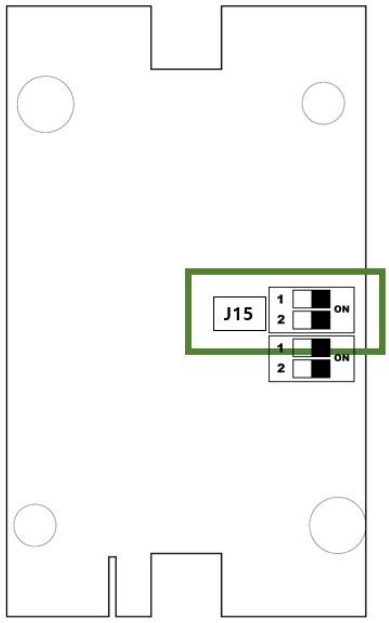
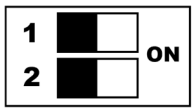
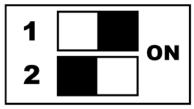
<td rowspan="3"> 
</td>
<td>N : NORMAL : No Calibration operation<br> 
</td>
</tr>
<tr>
<td>M: MCDL : Manual calibration mode<br>(in 400ppm fresh air)<br> 
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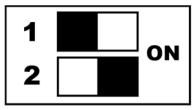
<tr>
<td>A : ACDL<br>(Automatic self-calibration operation mode)<br> 
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<tr>
<td>Calibration Switch : J15</td>
<td>Operation Mode Selection</td>
</tr>
</table>

- **M mode : manual calibration (MCDL)**
  Users can do 10 minutes manual calibration (MCDL) when sensor needs calibration in short time.

**Procedure** : Move switch to ‘M’ position and wait over 11 minutes at ambient air-flowing status near 400ppm, and move switch back to ‘NORMAL’ position after calibration.

- **A mode : Automatic self-calibration (ACDL)**
  When users are using the CD-700 in indoor ventilation applications like as HVAC, building, houses etc., the ACDL could calibrate sensor by itself, saving user’s management effort.

**Procedure** : Move switch to ‘A’ position. Auto-calibration act first in 2 days, second in 5 days, and every 7 days after then since power on.

## CD-700 series gas types available to order

Various gas types and measurement ranges that can be ordered with the CD-700 series

| Gas No. | Order Gas Model | (GAS/Range/ increments) | Default Model | Option |
|---|---|---|---|---|
| 1 | **CD-700(CO2)** | CO2 (NDIR 0~10,000ppm/1ppm | No LCD, Only RS- 485 Modbus<br><br>(no other optional) | **L** : LCD<br>**G** : PCB Coating<br>**TH** : Temperature & R.H. Sensor<br><br>**A** : Analog out<br>**R** : Relay<br>**B** : Buzzer |
| 2-1<br>2-2<br>2-3<br>2-4<br>2-5 | **CD-700(CH4)**<br>**CD-700(C2H4)**<br>**CD-700(C3H8)**<br>**CD-700(C4H10)**<br>**CD-700(C5H12)** | CxHy (NDIR):<br>(0~5,000ppm/1ppm,<br>0~100 %LEL/ 1%) | | |
| 3 | **CD700(C2H4)** | C2H4 (E.C.)<br>(0~10/0.01ppm,<br>0~100ppm/0.1 ppm,<br>0~1000ppm/1ppm) | | |
| 4 | **CD-700(CO)** | CO (E.C.)<br>(0~1000ppm/1ppm) | | |
| 5 | **CD-700(H2S)** | H2S (E.C.)<br>(0~ 100ppm/0.1ppm) | | |
| 6 | **CD-700(NH3)** | NH3 (E.C.)<br>(0~100ppm/0.1ppm) | | |
| 7 | **CD-700(O2)** | O2 (E.C.)<br>(0~ 25%/0.01%) | | |
| 8 | **CD-700(NO2)** | NO2 (E.C.)<br>(0~20ppm/0.1ppm) | | |
| 9 | **CD-700(NO)** | NO (E.C.)<br>0~ 5ppm / 0.01ppm | | |
| 10 | **CD-700(SO2)** | SO2 (E.C.)<br>(0~20ppm/0.1ppm) | | |
| 11 | **CD-700(H2)** | H2(E.C.)<br>(0~ 2000ppm/1ppm) | | |
| 12 | **CD-700(O3)** | O3 (E.C.)<br>(0~ 10ppm / 0.01ppm) | | |
| 13 | **CD-700(PM)** | PM(PM10, PM2.5, PM1.)<br>0~1,000 μg/㎥/1 μg/㎥ | | |

## Notice and precautions

1. When handling or installing this product, avoid physical, thermal, electric shock and high concentrations of corrosive gases, and be careful not to allow water to enter the product.
2. In this case, it may cause malfunction or shorten lifespan. Power should be selected within tolerance and wired into right position because the product could get damaged when 24V power input is inserted into signal output position.
3. Please install or keep the product away from the places where electro-static or induced electro-magnetic field exists.
4. The product's components should not be departed or replaced, or manipulated unless requested or agreed by vendor.
5. The product warrants solely to the original purchaser of this product for a period of 12 months (one year) from the date of delivery.
6. For any other inquiries, please contact our sales team. (sales@eltsensor.co.kr).

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