

# MODEL: SI-100

(Fixed Gas Detector)

## Manual



**SENKO**  
SenKo Co., Ltd

**⚠ WARNING**

Read this manual carefully before using the instrument. The instrument will perform as designed only if it is used and maintained in accordance with the manufacturer's instruction. Otherwise, it could fail to perform as designed and persons who rely on this instrument for their safety could sustain serious personal injury or death.

**Warning**

- Remove any debris on the surfaces of the sensor part before use.
- Test regularly whether the alarms go off properly.
- Use the device under the conditions instructed, including the temperature, humidity and pressure range. The use out of the instructed conditions may cause malfunction or failure.
- The sensors inside the device may indicate the gas concentration differently according to the environment such as temperature, pressure and humidity. Make sure to calibrate the detector under the same or similar environment to the specification.
- Severe shock to the device may cause failures of the device or sensors.
- Alarm values are set according to international standards. Therefore, the values must be changed by an authorized expert.

**Caution**

- Use the device after reading this manual thoroughly.
- This product is not a gas analyzer, but a gas detector.
- If calibration failure occurs continuously, stop using the equipment and contact the manufacturer.

**Warranty**

We, SENKO CO., LTD warrant replacement or repair for the products of SI series for 24 months from the shipment date of the product(s). However, the parts, whose life can be shortened by use, such as sensors, batteries and lamps are not under the warranty. Also, Free repair and replacement is not available in case of purchases of our products through unauthorized channels, mechanical damage and deformation by user's misuse, and calibration and replacements of parts without following the instruction in the manual. If any defect or quality problem occurs to the products during the warranty period, the user should notify it to the manufacturer. In this case, all the expenses except freight cost are paid by SENKO. Repair, replacement and freight cost for the products, whose warranty is already over, are paid by the user. SENKO CO., LTD does not have any responsibility for indirect, or accidental loss which occurs while using our products, and the warranty is limited to the exchange of parts and products. The warranty is subject to the users who have bought products from the authorized agency and office appointed by SENKO CO., LTD, and warranty repairs must be made through the designated A/S center of SENKO CO., LTD with a skilled technician.

## Table of Contents

<b>1. Introduction</b>	<b>4</b>
1.1. Specification	4
1.2. Sensor List	5
<b>2. Instrument Overview</b>	<b>6</b>
<b>3. How to install</b>	<b>7</b>
3.1. How to fix	7
3.2. How to open and wire	7
3.2.1 Separating Cover from Gas Detector Body	7
3.2.2 Gas Detector Wiring Diagram	8
<b>4. Measuring Mode</b>	<b>9</b>
4.1. Gas Detector Initial Operation	9
4.1.1 Initial Screen Explanation	10
4.2. Set Display	10
4.2.1 Description of Set Display	10
4.3. Advanced setting	11
4.4. How to modify the settings [Flow chart]	12
4.5. Zero calibration & Span calibration	13
4.5.1 How to connect Calibration cap	13
4.5.2 Calibration Mode Explanation	13
4.5.3 How to enter Calibration Mode	14
<b>5. Certificate</b>	<b>15</b>

# 1. Introduction

## 1.1. Specification



- ✓ Various sensors can be applied
- ✓ Easy operation with a magnetic bar
- ✓ Large digital LCD embedding white backlight
- ✓ Explosion-proof & Water/Dust-proof structure
- ✓ Automatic calibration function
- ✓ Long-distance transmission by 4-20mA output

Model	SI-100			
Measuring Type	Diffusion			
Measuring gas	Combustible		Toxic	Oxygen
Measuring Method	Catalytic	IR	Electrochemical cell	Galvanic
Measuring range	0~100 %LEL		* Refer to Sensor list	0~30 %VOL
Sensor life time	> 2 years	> 2 years	> 2 years	< 2 years
Response time	< 15sec/90%scale	< 30sec/90%scale	* Refer to Sensor list	< 15sec/90%scale
Accuracy	± 3%/Full Scale			
Resolution	1 %LEL		* Refer to Sensor list	0.1 %VOL
Parameter Control	Front 3 magnetic switch (calibration, maintenance, alarm setting)			
Operation mode display	Visual: LCD alarm display, LCD Backlight, Indicator LED Audible / buzzer (90dB at 10cm)			
Measuring value display	Digital LCD display(4-digit)			
Alarm display	Visual: LCD alarm display, LCD Backlight, Indicator LED			
Alarm output signal	Relay contact(max 30VDC, 5A) when Alarm occurred			
Alarm level set	Programmable within detection range			
Output signal	Analog 4-20mA, Digital : Rs-485(Optional)			
Pc interface	RS-485(Optional)			
Cable/Distance	(4-20mA and Power : CVVSB 1.5sq or AWG 20/ 2,500m max), (RS-485 data communication cable : UL2919 RS-485 1pair /1,200 max)			
Conduit connection	NPT 3/4" (2way)			
Mounting type	Wall mount			
Program set mode	Alarm value (1, 2 alarm), Alarm time (instant@delay) 1~30 min, Alarm dead band, output on/off			
Operating temperature	-20°C ~ +55°C			
Operating humidity	5 to 95% RH(Non-condensing)			
Operating power	10 ~ 36Vdc 600mA			
Material	Aluminum, Stainless steel(STS 304)			
LCD Size	55(W) X 30(H) mm			
Dimensions	150(W) x 165(H) x 110(D) mm			
Weight	Standard type : 1.9Kg			
Approval	EX d IIC T5 (IP65)_IECEx, CE EMC, ATEX, TR CU, CPA, CNEx, Inmetro, Peso, etc.			

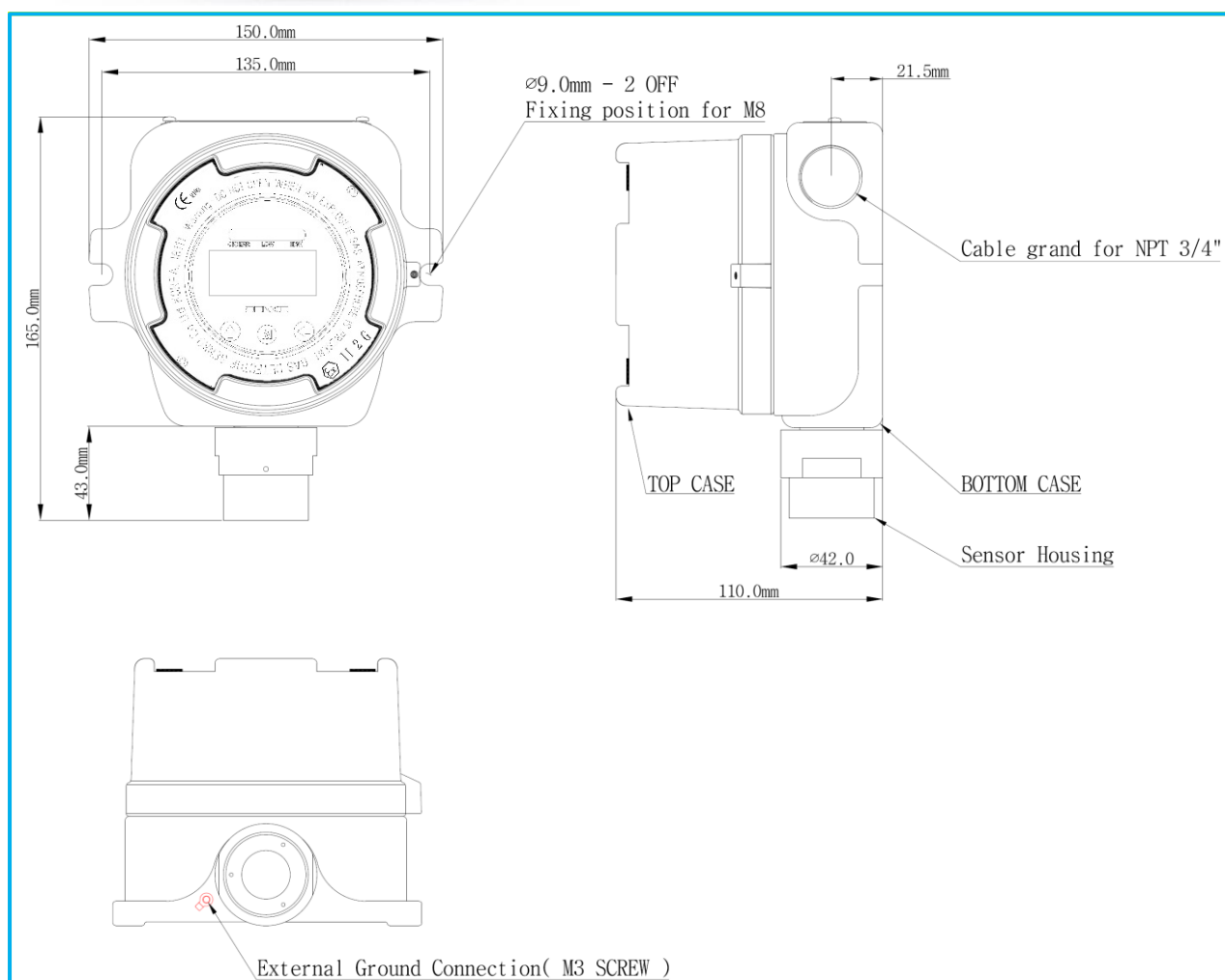
## 1.2. Sensor List

Gas		Sensor	Range	A1	A2	Resolution
Oxygen	O <sub>2</sub>	Electrochemical	0~30%Vol	19.0%vol	23.0%vol	0.1%vol
Carbon Monoxide	CO	Electrochemical	0~500ppm	30ppm	60ppm	1ppm
Sulfur Dioxide	SO <sub>2</sub>	Electrochemical	0~20ppm	2ppm	5ppm	0.1ppm
Hydrogen	H <sub>2</sub>	Catalytic	0~100%LEL	15%LEL	50%LEL	1%LEL
Hydrogen	H <sub>2</sub>	Electrochemical	0~1000ppm	100ppm	500ppm	within 5ppm
Hydrogen Sulfide	H <sub>2</sub> S	Electrochemical	0~500ppm	10ppm	15ppm	1ppm
Combustible	-	Catalytic	0~100%LEL	15%LEL	50%LEL	1%LEL
Combustible	-	IR	0~100%LEL	15%LEL	50%LEL	1%LEL
Ammonia	NH <sub>3</sub>	Electrochemical	0~100ppm	25ppm	35ppm	1ppm
Acetylene	C <sub>2</sub> H <sub>2</sub>	Catalytic	0~100%LEL	15%LEL	50%LEL	1%LEL
Ethanol	C <sub>2</sub> H <sub>6</sub> O	Catalytic	0~100%LEL	15%LEL	50%LEL	1%LEL
Toluene	C <sub>7</sub> H <sub>8</sub>	IR	0~100%LEL	15%LEL	50%LEL	1%LEL
Toluene	C <sub>7</sub> H <sub>8</sub>	Catalytic	0~100%LEL	15%LEL	50%LEL	1%LEL
Methane	CH <sub>4</sub>	IR	0~100%LEL	15%LEL	50%LEL	1%LEL
Methane	CH <sub>4</sub>	Catalytic	0~100%LEL	15%LEL	50%LEL	1%LEL
Chlorine	Cl <sub>2</sub>	Electrochemical	0~5ppm	0.5ppm	1.0ppm	0.1ppm
Chlorine	Cl <sub>2</sub>	Electrochemical	0~20ppm	0.5ppm	1.0ppm	0.1ppm
Carbon Dioxide	CO <sub>2</sub>	IR	0~2000ppm	1000ppm	1500ppm	3ppm
Carbon Dioxide	CO <sub>2</sub>	IR	0~5000ppm	3000ppm	5000ppm	8ppm
Carbon Dioxide	CO <sub>2</sub>	IR	0~5%Vol	0.5%vol	3%vol	0.1%vol
Hydrogen Chloride	HCl	Electrochemical	0~10ppm	1ppm	2ppm	0.1ppm
VOC	VOC	PID	0~1000ppm	50ppm	100ppm	within 3ppm
Xylene	C <sub>8</sub> H <sub>10</sub>	IR	0~100%LEL	15%LEL	50%LEL	1%LEL
Hydrogen peroxide	H <sub>2</sub> O <sub>2</sub>	Electrochemical	0~10ppm	1ppm	2ppm	0.1ppm
Nitrogen Dioxide	NO <sub>2</sub>	Electrochemical	0~20ppm	3ppm	5ppm	0.1ppm
Ethylene oxide	C <sub>2</sub> H <sub>4</sub> O	Electrochemical	0~30ppm	1ppm	2ppm	0.1ppm
Ethylene	C <sub>2</sub> H <sub>4</sub>	Catalytic	0~100%LEL	15%LEL	50%LEL	1%LEL
Nitrogen Monoxide	NO	Electrochemical	0~100ppm	25ppm	50ppm	1ppm
Hydrogen fluoride	HF	Electrochemical	0~5ppm	0.5ppm	1ppm	0.1ppm

## 2. Instrument Overview



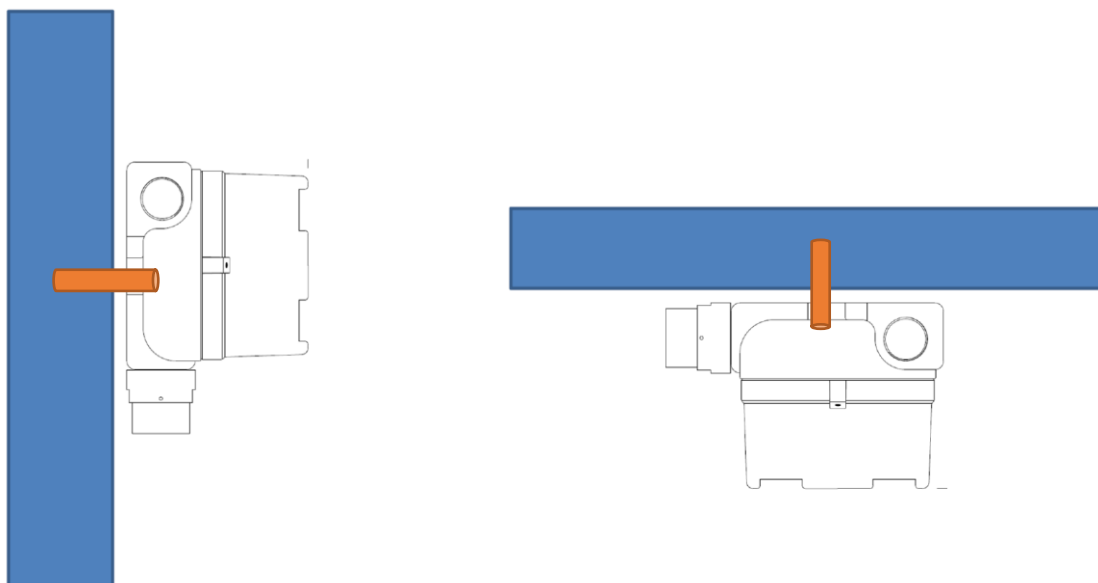
1. OK/ERR LED (Power & Operation)
2. LOW Alarm (1<sup>st</sup> alarm)
3. HIGH Alarm (2<sup>nd</sup> alarm)
4. Sensor Housing and Sensor Part
5. Buttons (Use a Magnetic bar)



### 3. How to install

**!** Installing a detector at a site, opening the cover of a detector, or operating it may cause fire or explosion depending on the environment. Therefore, you should proceed with your work after turning off the power and examining whether explosive residual gas is around you or not.

#### 3.1. How to fix



You can easily install a detector on a wall or ceiling like the above drawing by using M8 Bolts or other bolts.

#### 3.2. How to open and wire

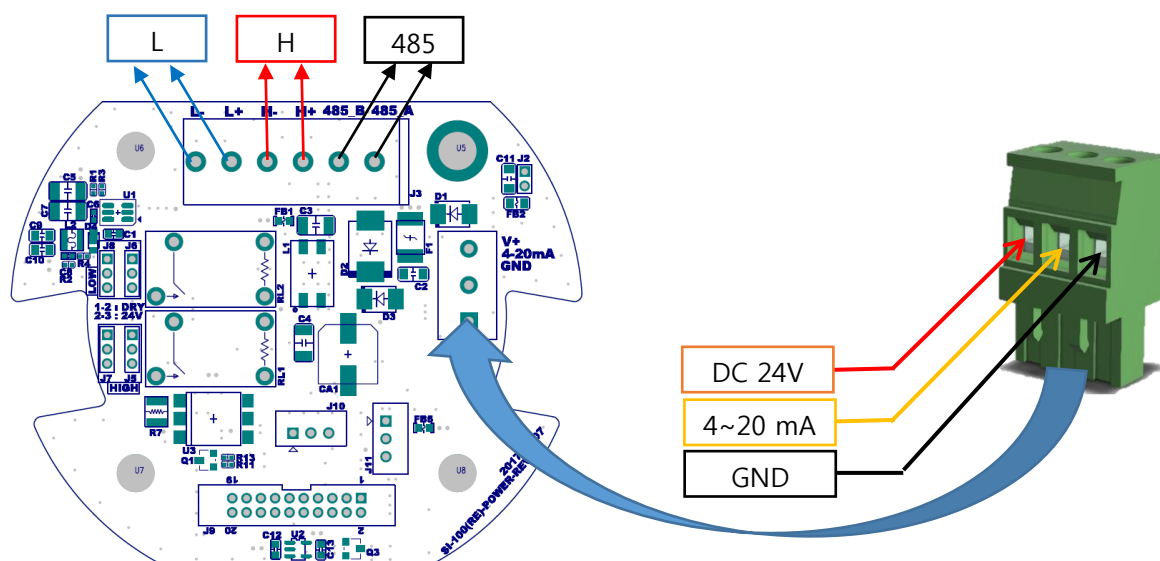
##### 3.2.1 Separating Cover from Gas Detector Body



➤ Use a screwdriver to fasten the bolt (for preventing separating of the Cover from the body) of the enlarged picture on the side and turn it counterclockwise by two or three turns. Then hold the cover of the gas monitor and turn it counterclockwise to remove the Cover.



### 3.2.2 Gas Detector Wiring Diagram

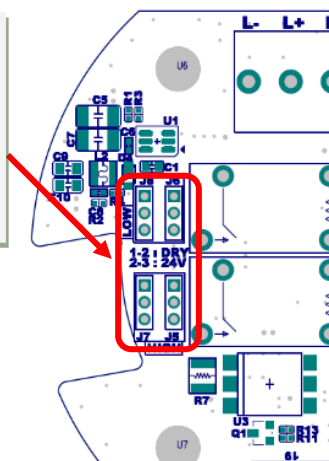


L	Contact output in LOW alarm (DRY or DC 24V)
H	Contact output in HIGH alarm (DRY or DC 24V)
485	RS 485+ Telecommunication output

Normal : Dry

1-2 pin connect : Dry

2-3 pin connect : 24V



LOW : DRY  
HIGH : DRY



LOW : 24V  
HIGH : DRY



LOW : DRY  
HIGH : 24V

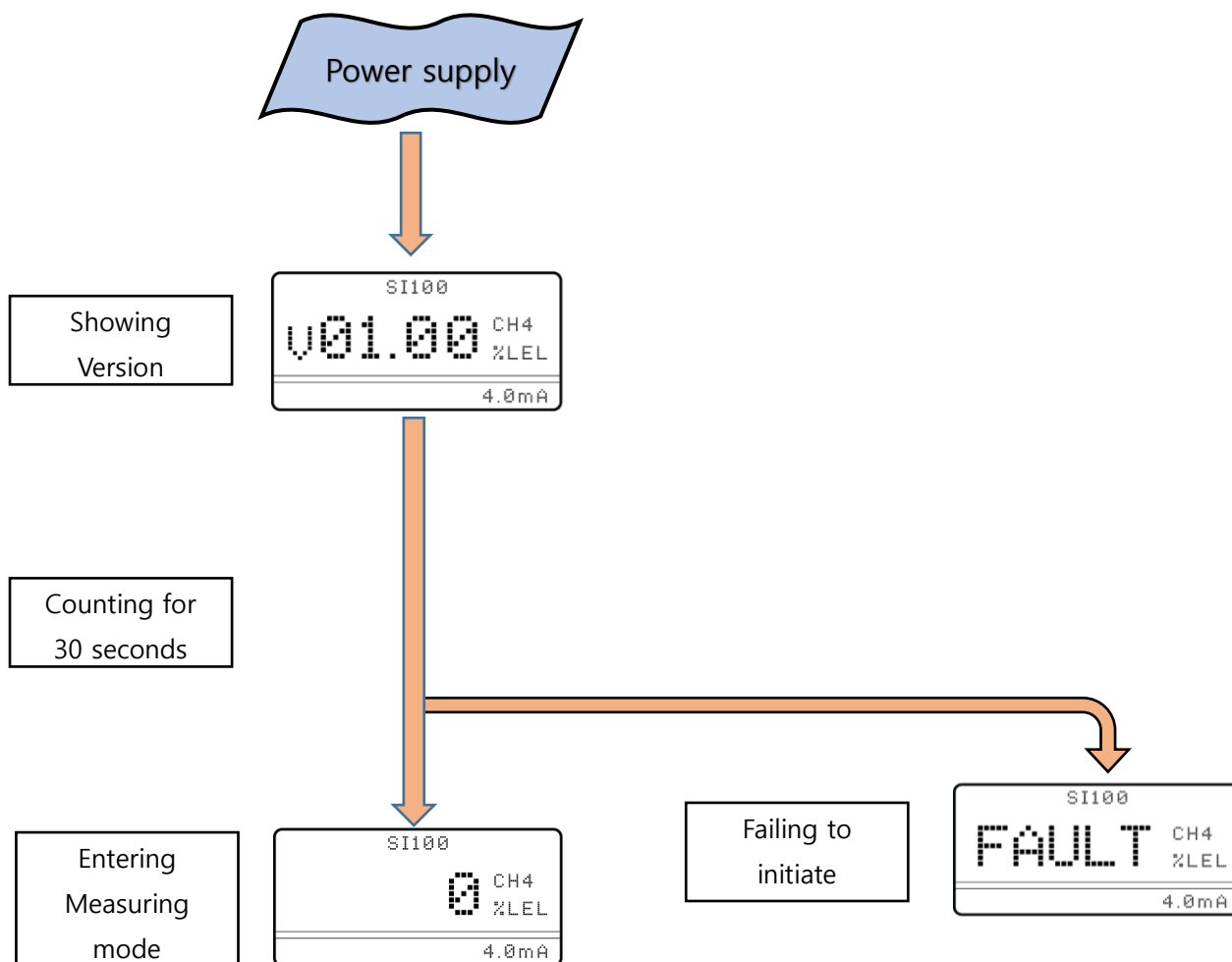


LOW : 24V  
HIGH : 24V

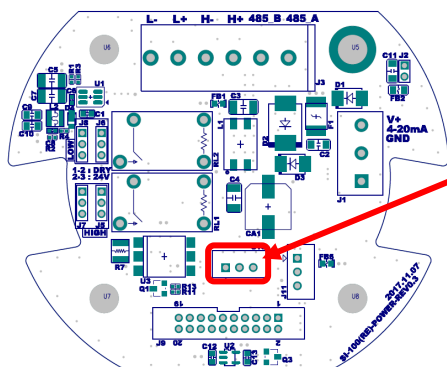


## 4. Measuring Mode

### 4.1. Gas Detector Initial Operation



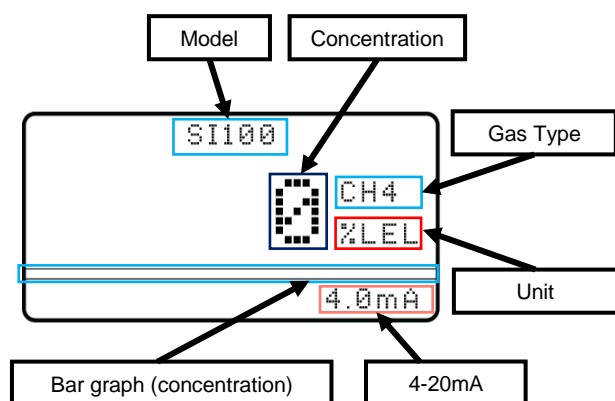
When this gas detector repeatedly fails to initiate measuring mode, first you should check the conditions of the connection between gas sensors and the detector. When it is impossible for the detector to initiate measuring mode even when the connection to the sensors is proper, the gas detector should require checks and repairs. Therefore, please contact SENKO CO., LTD or your supplier.



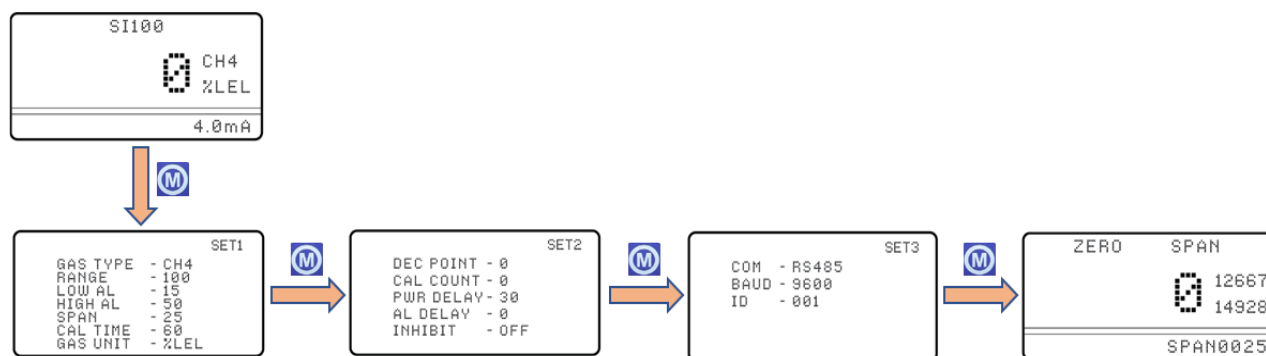
#### Gas Sensor Connection Pin

(When this gas monitor fails to initiate measuring mode, you need to check whether pins are connected correctly.)

### 4.1.1 Initial Screen Explanation



## 4.2. Set Display

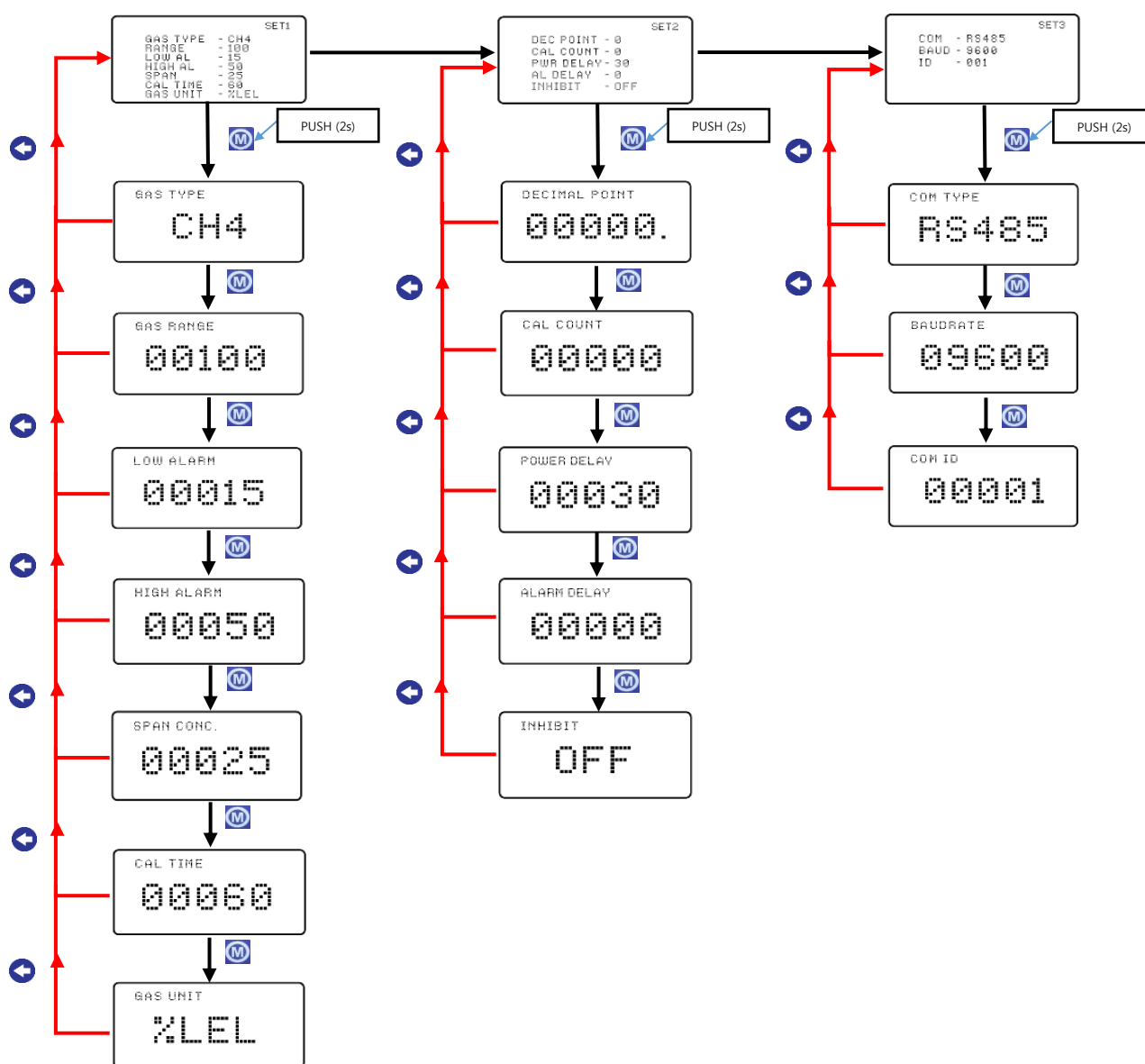


The displays are sequentially shown whenever you press each mode key (M) by using a magnetic bar.

### 4.2.1 Description of Set Display

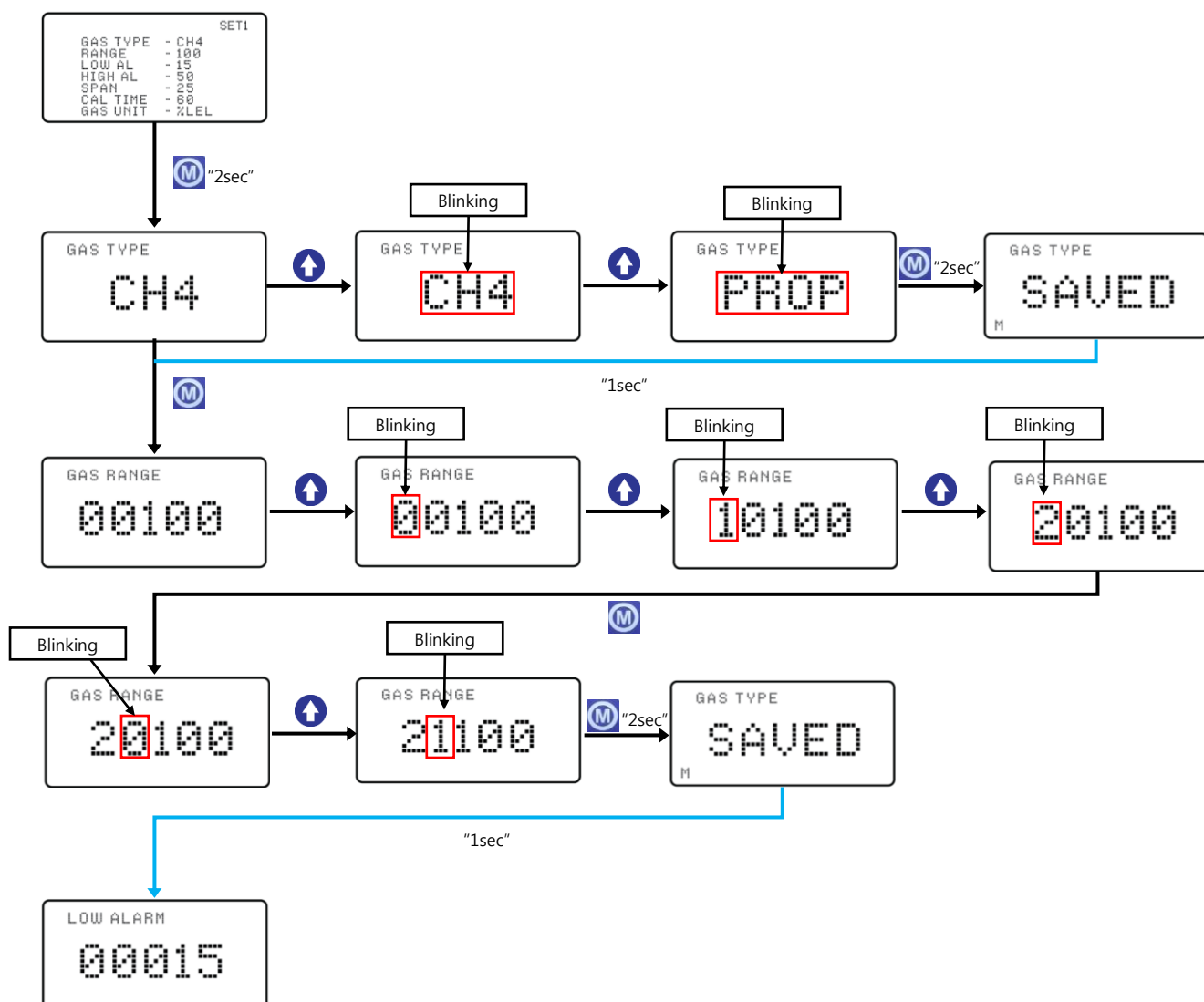
LCD Display	Description
<div>SET1</div> <pre> GAS TYPE - CH4 RANGE - 100 LOW AL - 15 HIGH AL - 50 SPAN - 25 CAL TIME - 60 GAS UNIT - %LEL           </pre>	<ul style="list-style-type: none"> <li>➤ GAS TYPE: measuring gas, automatic changes of related information (Range, Low&amp;High Alarm, Span, Unit and point, etc.)</li> <li>➤ RANGE: maximum measurable range</li> <li>➤ LOW AL: LOW (1st) alarm setting values</li> <li>➤ HIGH AL: HIGH (2nd) alarm setting values</li> <li>➤ SPAN: calibration gas concentration</li> <li>➤ CAL TIME: required calibration time</li> <li>➤ GAS UNIT: unit of measuring gas (%VOL, PPM or %LEL)</li> </ul>
<div>SET2</div> <pre> DEC POINT - 0 CAL COUNT - 0 PWR DELAY - 30 AL DELAY - 0 INHIBIT - OFF           </pre>	<ul style="list-style-type: none"> <li>➤ DEC POINT: decimal point for measuring gas concentration</li> <li>➤ CAL COUNT: No. of Span calibration (0-100), not able to change</li> <li>➤ PWR DELAY: initial delay time settings in power supply</li> <li>➤ AL DELAY: delay time settings for alarm occurrence</li> <li>➤ INHIBIT: settings for holding alarm and current output</li> </ul>
<div>SET3</div> <pre> COM - RS485 BAUD - 9600 ID - 001           </pre>	<ul style="list-style-type: none"> <li>➤ COM: communication method (RS485 or HART or NONE)</li> <li>➤ BAUD: communication speed (baud rate) settings (9600, 19200, 38400)</li> <li>➤ ID : ID settings (0~254)</li> </ul>

### 4.3. Advanced setting



- Press MODE key (M) for 2 seconds by using the magnetic bar in Set Display to enter Advanced setting.
- Press MODE key (M) by using the magnetic bar in Advanced setting screen, in order to go to another menu.
- Press DOWN key (D) by using the magnetic bar to go back to the main menu (SET 1, 2 or 3).
- Without magnetic operation for 60 seconds, the display returns to the main menu (SET 1, 2 or 3).

## 4.4. How to modify the settings [Flow chart]



- Press MODE key (M) for 2 seconds by using the magnetic bar in Set Display, in order to enter Advanced setting.
  - When you press UP key (↑) by using the magnetic bar in Advanced setting display, setting values flicker, which means they can be changed.
  - Press UP key (↑) when setting values flicker, in order to change the values.
  - Press MODE key (M) for 2 seconds to save the changes of setting values. These changes are saved with the indication, "SAVED".
- ✓ When GAS TYPE is changed, related settings (GAS UNIT, RANGE, ALAMR, etc.) are changed as well.  
**In order to operate properly, sensor replacement for the gas type and calibration is required.**
  - ✓ When you press DOWN key (←) in each mode, the mode goes back to its previous step.

## 4.5. Zero calibration & Span calibration

### ⚠ WARNING

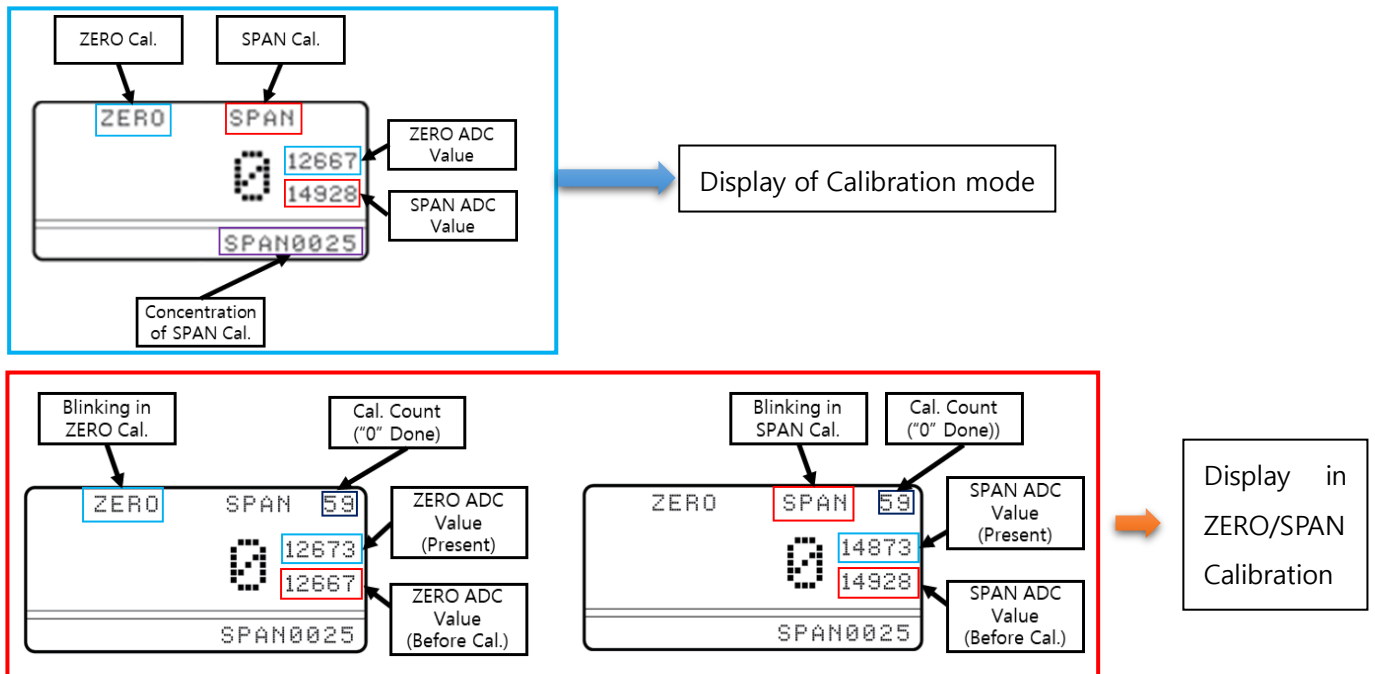
Do not conduct Zero Calibration unless you are sure you are in fresh, uncontaminated air. Otherwise, inaccurate reading can occur, then show that a hazardous atmosphere is safe. If you have any doubts as to the quality of the surrounding air, Calibration with N2 gas should be done. Failure to follow this warning can result in serious personal injury or death.

#### 4.5.1 How to connect Calibration cap



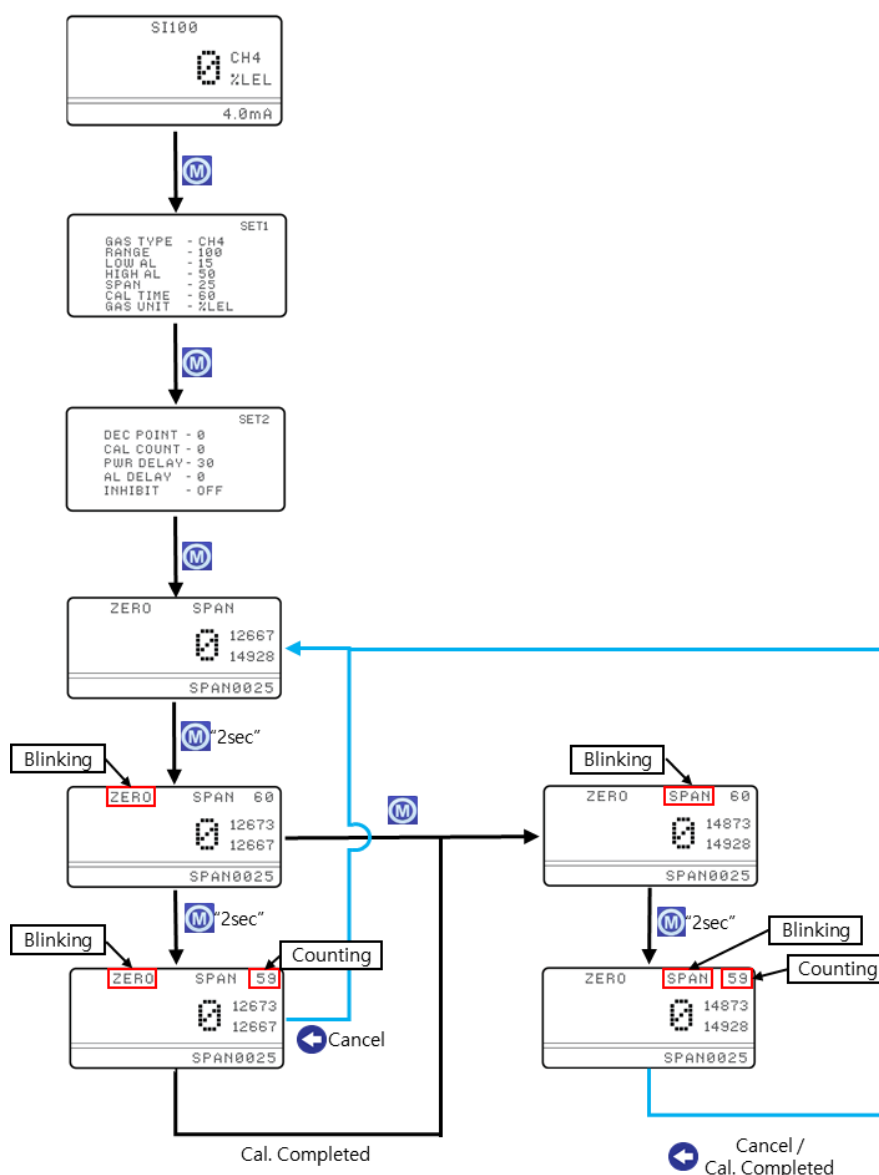
- Correctly attach the calibration cap to the sensor part of the gas detector (SI-100) as the picture above (using flow meter, etc., flow rate: about 300 SCCM) and inject the calibration gas.

#### 4.5.2 Calibration Mode Explanation



- In Calibration mode, the ADC values of ZERO and SPAN are displayed. When you conduct ZERO/SPAN Calibration, Cal. Count starts counting. In the meantime, ADC Value (Present) is displayed on the above part and ADC Value (Before Cal.) on the below part.

### 4.5.3 How to enter Calibration Mode



- Press MODE key (M) 4 times by using the magnetic bar in Measuring mode, in order to enter Calibration mode.
- Press MODE key (M) for 2 seconds by using the magnetic bar in Calibration mode, in order to enter ZERO calibration when "ZERO" flickers. Then, press MODE key (M) for 2 seconds once again to initiate ZERO calibration.
- When ZERO calibration is completed, the display automatically shifts to SPAN calibration. The process is same as ZERO calibration.
- ✓ If ZERO calibration ADC value (EX: 12667) goes beyond the SPAN calibration ADC value (EX: 14928), you may suspect failure of calibration or malfunction of the gas sensor. **In this case, you should carry out recalibration or receive formal A/S to take appropriate measures for the case.**

## 5. Certificate

		<h3>IECEX Certificate of Conformity</h3>	
<p align="center"><b>INTERNATIONAL ELECTROTECHNICAL COMMISSION</b>  <b>IEC Certification Scheme for Explosive Atmospheres</b>  <small>for rules and details of the IECEx Scheme visit <a href="http://www.iecex.com">www.iecex.com</a></small></p>			
Certificate No.:	IECEX KTL 14.0014	Issue No: 0	Certificate history: Issue No. 0 (2014-09-05)
Status:	Current	Page 1 of 3	
Date of Issue:	2014-09-05		
Applicant:	<b>SENKO Co., Ltd</b> 73, Oesammi-ro, 15 Beon-gil, Osan-si, Gyeonggi-do 447-230 <b>Korea, Republic of</b>		
Electrical Apparatus:	<b>SI series Fixed Gas Detector</b>		
Optional accessory:			
Type of Protection:	<b>Flameproof enclosure "d"</b>		
Marking:	Ex d IIC T5 Gb IP65 Tamb : -20°C ~ +55°C		
Approved for issue on behalf of the IECEx Certification Body:		Kang Ho-woo  Certification Manager	
Position:		 2014. 09. 05	
Signature: (for printed version)			
Date:			
1. This certificate and schedule may only be reproduced in full. 2. This certificate is not transferable and remains the property of the issuing body. 3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.			
Certificate issued by: <div style="display: flex; justify-content: space-around; align-items: center;"> <div> <b>Korea Testing Laboratory</b>              87, Digital-ro, 28-gil, Guro-gu              Seoul              Korea, Republic of           </div> <div>  </div> </div>			



**KR HELLAS LTD.**  
 41, Athinas Av., Vouliagmeni,  
 GR-16671, Athens, Greece

TEL: +30-210-428-6736  
 FAX: +30-210-428-6728



**Certificate No:**  
**KRH 16 ATEX 1017**  
 Issue No: 0 (2016.04.19)

Page: 1/3

## 1. EC-TYPE EXAMINATION CERTIFICATE

2. Equipment and protective system intended for use in potentially explosive atmospheres:  
**Directive 94/9/EC**
3. EC-Type-examination Certificate Number:  
**KRH 16 ATEX 1017**
4. Equipment: **Fixed Gas Detector type SI-100**
5. Manufacturer: **SENKO Co., Ltd**
6. Address: **73, Oesammi-ro, 15 Beon-gil, Osan-si, Gyonggi-do, 447-230, Korea, Republic of**
7. This equipment or protective systems and any acceptable variation thereto are specified in the schedule to certificate and the documents therein referred to.
8. The KRH certifies that equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, give in Annex II to the Directive 94/9/EC of 23 March 1994. The examination and test results are recorded in the confidential report number KRH-ATEX-0047-2015.
9. Compliance with the Essential Health and Safety Requirements has been assured by compliance with:  
**EN 60079-0:2012 EN 60079-1:2007**
10. If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
11. This EC-Type-examination Certificate relates only to the design and construction of the specified equipment or protective systems in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment or protective systems.
12. The marking of the equipment shall include the following:

**Ex II 2 G Ex d IIC T5 Gb IP65**

This certificate is issued at Athens on 19<sup>th</sup> April 2016, under the authority of the Hellenic Republic of Greece by KR Hellas Ltd., Notified Body No. 2198.



Notified Body No.2198



*Shin Jeong-do*

**CEO of KR Hellas Ltd**

*Any person not a party to the contract pursuant which this document is delivered may not assert a claim against KRH for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgment, fault or negligence committed by personal of KRH in establishment or issuance of this document, and in connection with any activities for which it may provide. In this provision KRH shall mean the KR Hellas Ltd. as well as all its subsidiaries, directors, officers, employees and any other acting on behalf of KR Hellas Ltd.*