. **INSTRUCTIONS MANUAL**

Fixed Gas Detector
SI-100



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⚠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.

This manual contains operating instructions for stationary gas monitoring instruments designed for area air quality and safety applications, and should be STUDIED CAREFULLY by all persons responsible for the operation and maintenance of the instruments. All SENKO equipment described herein is designed or manufactured for use only as set forth herein and by the labels affixed, or other literature accompanying the product.
Where WARNINGS or CAUTIONS are herein set forth, they must be followed. If SENKO equipment is used in a manner or under conditions not specifically authorized or prescribed by this manual, or by other materials or written instructions either accompanying the product or authorized by SENKO in writing, or if it is used or maintained by unqualified or improperly trained personnel, SENKO Co., Ltd. disclaims all responsibility of every kind for said equipment. While basic connection installation instructions are included, all equipment must be installed by qualified electricians FOLLOWING ALL ASPECTS OF THE LOCAL CODE REQUIREMENTS. Also, the instruments must be calibrated and alarms tested periodically by trained personnel for proper functioning of the instruments.
CAUTION: The overall system, especially where gas monitoring sensors are used, must be CALIBRATED BY QUALIFIED PERSONNEL. Thereafter, a monthly calibration check is recommended to assure reliability and accuracy.
Please call the factory if any problems are encountered.

WARRANTY

SENKO sensors and instruments are designed for area air quality and safety applications. SENKO gas monitoring instruments are provided with a one year warranty. This warranty covers only defective parts or workmanship in normal use and service. Instruments which fail to function due to factory defect
within one year of date of shipment are to be returned to SENKO for warranty repair.
SENKO will determine the nature and responsibility for the defect. In all cases the warranty is limited to the original cost of the equipment. Any misuse of equipment is the customers responsibility. SENKO will either repair or replace (at SENKO's option) returned instruments subject to the warranty, at no charge. No field service is included in this warranty. For field service requirements please contact SENKO.
This warranty is voided by:
1. Improper application of instrument.
2. Misuse of instrument.
3. Intentional or accidental damaging of instrument.
4. Not returning the sensor to factory for warranty validation.

For any queries regarding warranty repair or replacements, please include the instrument model and serial number in any transmittals to SENKO. SENKO instruments are supplied with operating and installation manuals and other literature. These are the only source of specific details regarding proper operation and maintenance of the equipment. These instructions must be carefully read and the precautions followed in detail. Instruments must be calibrated and alarms checked periodically to
assure proper equipment operation. Please refer to the manual for details.

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Introduction



Features

· Product of LCD display type can measure the concentration of the flammable gas, toxic gas and oxygen gas
· Simple operation with the magnetic bar
· Big digital LCD installed the blue backlight
· Explosive proof structure for the pressure and the water/dust-proof structure
· Automatic calibration function

Specification

Model	SI-100			
Sampling Method	Diffusion Type			
Measuring value display	Digital LDC(Blue Backlight)			
Detecting gas	Combustible Gas		Toxic Gas	Oxygen
Detecting type	Catalytic	IR	Electrochemical	Galvanic
Detecting range	0-100% LEL	0-100%LEL	-	0-30% Vol.
Accuracy	±3% / Full Scale			
Setting & Control	Magnetic interface to configure alarm & calibrations			
Alarm signal	1st alarm, 2nd alarm, Relay contact(Max 30VDC,5A)			
Output signal	Analog: 4-20mA Digital: RS-485 Modbus			
Telemetering line length	Analog output Max. 2,500m Digital output Max. 1,000m			
Operating temp. & Humi.	-20 to 50°C : 5 to 95% RH (Non - condensing)			
Calibration	2 point calibration			
Power	10 to 34VDC, MAX 500mA			
Dimension	150(W) × 165(H) × 110(D) mm , Weight: 1.8kg			
Explosion Proof	Ex d IICT5, IP65			

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1. Description

Instrument Overview



1. Zero Calibration LED
2. Span Calibration LED
3. "OK, FAULT, LOW, HIGH" alarm LED
4. LCD display
5. "+ and ⬆, Mode and ◉, - and ⬇" Control key
6. Sensor

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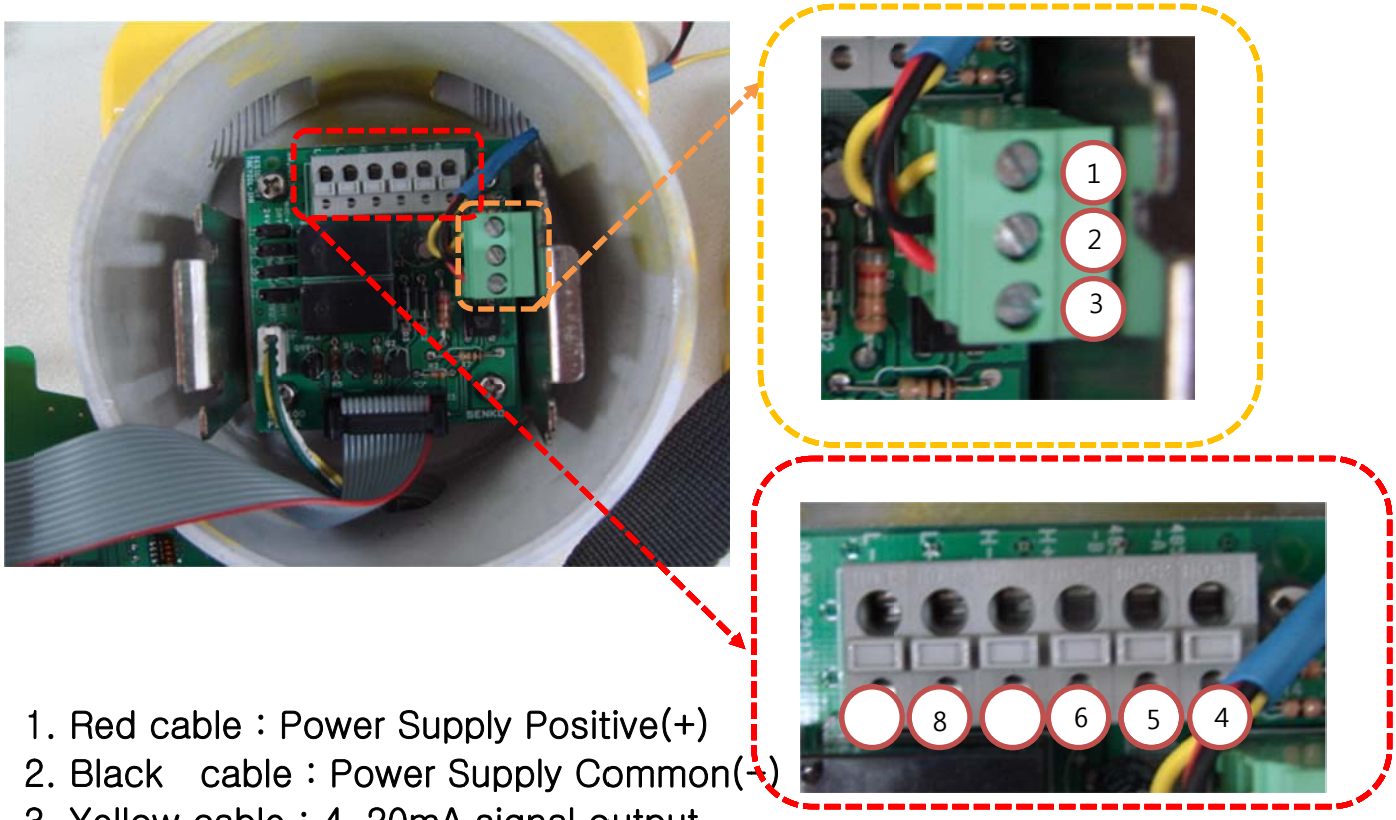
2. Sensor Specification

Sensor	Range	Span	Low Alarm	High Alarm
O2	0~30%	20.9%	19.5%	23.5%
CO	0~500ppm	100ppm	25ppm	50ppm
H2S	0~100ppm	50ppm	10ppm	30ppm
H2	0~1000ppm	500ppm	100ppm	500ppm
SO2	0~20ppm	10ppm	2ppm	4ppm
CH4	0~100%LEL	20%LEL	10%LEL	20%LEL

3. Electrical Wiring



1. Red cable : Power Supply Positive(+)
2. Black cable : Power Supply Common(-)
3. Yellow cable : 4-20mA signal output

4. cable : 485 (+)
5. cable : 485 (-)
6. cable : High Alarm relay(+)
7. cable : High Alarm relay(-)
8. cable : Low Alarm relay(+)
9. cable : Low Alarm relay(-)

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4. Default Alarm Relay Logic

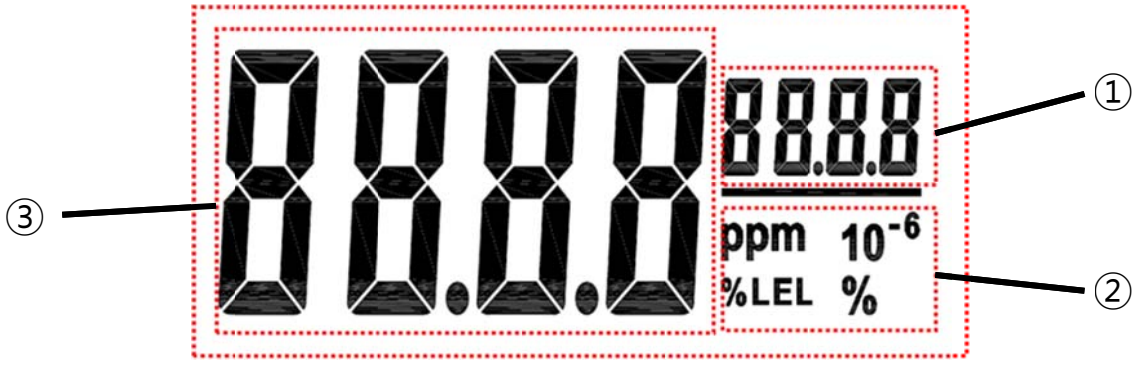
	External Alarm	LED	LCD	Analog Output
Exceed Low alarm limit	Low alarm	Low	Reading	Based on reading
Exceed High alarm limit	High alarm	High	Reading	Based on reading
Sensor Fail	Low alarm	Fault	"FAIL SEn" message	2mA
Calibration Fail	Low alarm	Fault	"FAIL CAL" message	2mA
Over Range	Low alarm	Fault	"OvEr" message	2mA

5. Calibration

① Zero calibration – use Can Gas or Fresh air for 60 seconds

② Span calibration – use span gas for 60 seconds

6. LCD Display Configuration



① Gas type

② Unit

③ Gas concentration

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7. Button Definition

Button	Description
+ , [▲]	The [▲] button is used to increase the values in set-up mode
- , [▼]	The [▼] button is used to decrease the values in set-up mode
MODE , [●]	The [●] button is used to change the mode

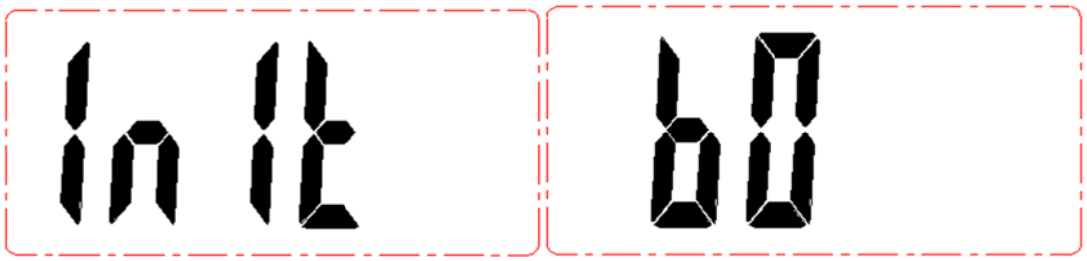
8. Turning on the Instrument

① The instrument will be turned on by power supply.

② Backlight will light and software version will be displayed



③ After this, the instrument will go into a 60 second countdown for initialization. During the countdown sequence, "Inlt" message and count number will be displayed alternately.



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④ When initialization process finished, "OK" LED will flash once and SI-100 will be its gas reading mode.



9. Measurement Mode

⚠WARNING

If the LOW or HIGH alarm activates, leave the contaminated area immediately; the ambient gas concentration has reached the preset LOW or HIGH alarm level.
Failure to follow this warning will cause over-exposure to toxic gases and persons relying on this product for their safety could sustain serious personal injury or death.

Once the SI-100 enters into the Measurement Mode, gas will be continuously monitored and the readings updated on the liquid crystal display. As gas levels increase, the corresponding reading will reflect the current gas concentrations.

The instrument has two alarm set points:

- HIGH Alarm
- LOW Alarm

① When the gas concentrations drop below the alarm set points, the LOW LED will blink with LCD backlight, and relay LOW alarm will be activated.

② When the gas concentrations increase above the alarm set points, the HIGH LED will blink with LCD backlight, and relay HIGH alarm will be activated.

③ If the gas concentrations go out of the measurement range, Fault LED will blink with backlight and will have a 2mA analog signal output.
Also, the instrument will show "over" message and relay LOW alarm will be activated.

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NOTICE

We recommend calibration once every six months, at least once a year. Sensor's output going down as time goes by; measurement error will increase.
Calibration is crucial for the sensor performance and persons relying on this product for their safety.

10. Zero calibration mode

Toxic gas sensor's Zero Calibration can be performed by 2 way; (1)Fresh air calibration (2) Nitrogen(N2) calibration

(1) Fresh air Calibration

⚠WARNING

Do not Fresh Air Calibration unless you are certain you are in fresh, uncontaminated air; otherwise, inaccurate readings can occur which can falsely indicate that a hazardous atmosphere is safe. If you have any doubts as to the quality of the surrounding air, do not use the Fresh Air Calibration feature. The calibration check is required to verify span accuracy. Failure to follow this warning can result in serious personal injury or death.

① Press the "**MODE**(◉)" key twice from the Measurement Mode will put the SI-100 in the Zero Calibration Mode.

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② Press the "**+**(⬆)" key once when Zero LED lighted and LCD displayed "ZERO".



③ The instrument will go into a 60 second countdown for Zero Calibration. "ZERO" message and count number will be displayed alternately.

④ During the countdown sequence, the instrument will have 4mA analog signal output. Calibration will be finished after 60 second with blink OK LED once and SI-100 enters into the measurement mode.

⑤ The instrument will stop calibration and go back to measurement mode by pressing "-(⬇)" key during the Zero Calibration mode.

(2) Nitrogen(N2) Calibration

⚠WARNING

Nitrogen Calibration must be performed using a flow regulator with a flow rate set from 0.2 to 0.3 liters per minute; otherwise, it can be seriously impair instrument performance, wrong readings could occur, and persons relying on this product for their safety could sustain serious personal injury or death.

① Press the "**MODE**(◉)" key twice from the Measurement Mode will put the SI-100 in the Zero Calibration Mode.

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② Application "**Nitrogen(N2)**" gas when Zero LED lighted and LCD displayed "ZERO"(**flow rate set from 0.2 to 0.3 sccm**).
-SEE 'calibration cab link' below.



<calibration cab link>

③ Press the "**+**(⬆)" key once when calibration cab linked properly.



④ The instrument will go into a 60 second countdown for Zero Calibration. "ZERO" message and count number will be displayed alternately.

⑤ During the countdown sequence, the instrument will have 4mA analog signal output. Calibration will be finished after 60 second with blink OK LED once and SI-100 enters into the measurement mode.

⑥ The instrument will stop calibration and go back to measurement mode by pressing "-(⬇)" key during the Zero Calibration mode.

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11. Span calibration mode

⚠WARNING

Span calibration must be performed using a flow regulator with a flow rate set from 0.2 to 0.3 liters per minute, concentration at 50ppm which is pre-set from manufacturer; otherwise, it can be seriously impair instrument performance, wrong readings could occur, and persons relying on this product for their safety could sustain serious personal injury or death.

① Press the "**MODE**(◉)" key twice from the Measurement Mode will put the SI-100 in the Zero Calibration Mode.

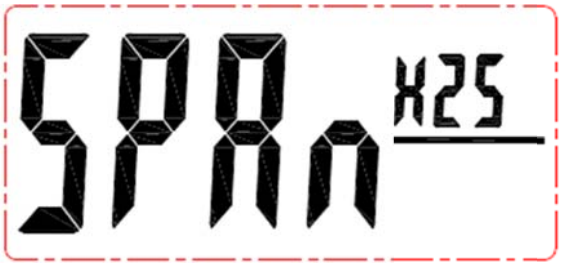
② Press the "**MODE**(◉)" key once again when ZERO LED lighted and LCD displayed "ZERO**".**

③ Application "**hydrogen sulfide(H2S)**" when SPAN LED lighted and LCD displayed "SPAN"(**flow rate set from 0.2 to 0.3 sccm**).
-SEE 'calibration cab link' below.



<calibration cab link>

④ Press the "**+**(⬆)" key once when calibration cab linked properly.



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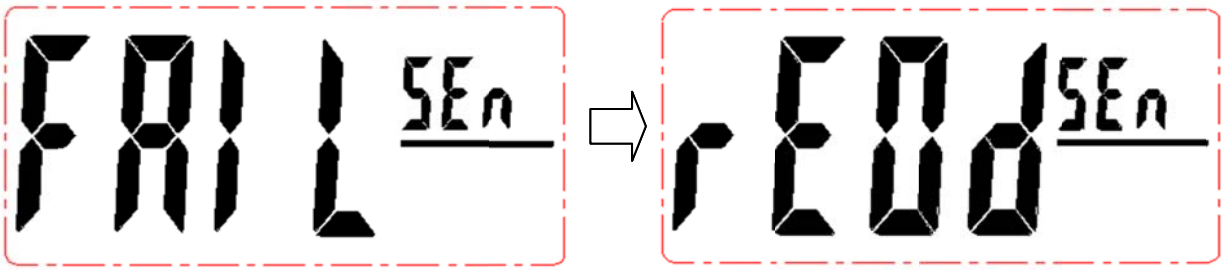
⑤ The instrument will go into a 60 second countdown for Span Calibration. "SPAN" message and count number will be displayed alternately.



⑥ During the countdown sequence, the instrument will have 20mA analog signal output.

⑦ SI-100 will check the sensor after 60 second. If the sensor is normal, the instrument will check Calibration.

⑧ If the sensor's output is below 75% of setting value, "fail sen" message will blink. After that, "reod sen" message will be displayed and the instrument will have 2mA of analog signal output.



At this time, the SI-100 will redo SPAN Calibration by pressing "**+**(⬆)" key, will stop the calibration with previous calibration value and go back to measurement mode by pressing "**-**(⬇)" key.

⑨ At the Calibration check, when the concentration of gas which used to Calibration is within 5% of setting value from Calibration mode, the instrument will display "true".

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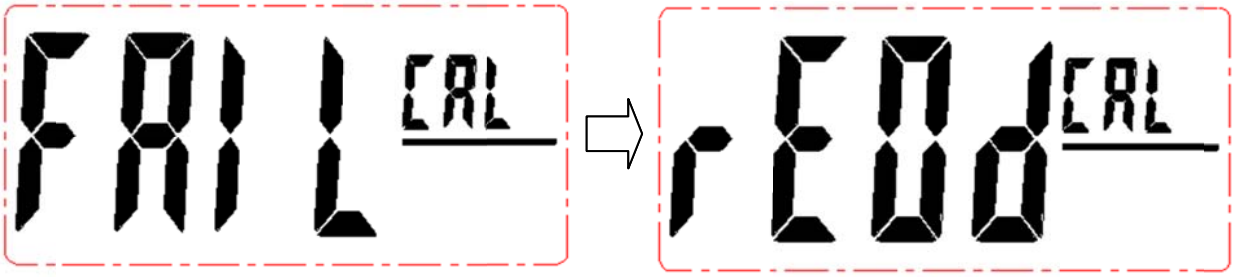
⑩ If the value is exceed the 5% of setting value, "fail cal" message will blink. After that, LCD will display "reod cal" message and the instrument will have 2mA of analog signal output.



At this time, the SI-100 will redo SPAN Calibration by pressing "**+**(⬆)" key, will stop the calibration with previous calibration value and go back to Measurement Mode by pressing "**-**(⬇)" key.

⑪ Calibration will be ceased and go back to measurement mode by pressing "**-**(⬇)"key in the SPAN Calibration Mode.

12. Calibration Gas Setting Mode

① Press the "**+**(⬆)","**-**(⬇)","**MODE**(●)" keys in order from the Measurement Mode will put the SI-100 in the Calibration Gas Mode.

② After press "**+**(⬆)" key, press "**+**(⬆)"key once more will increase the value and press "**-**(⬇)" key will decrease the value.
If press "**-**(⬇)" key without press "**+**(⬆)" key, the instrument will go back to Measurement Mode.

③ Press "MODE(●)" key once will save setting value and go back to Calibration Gas Mode.



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13. Low Alarm Value Mode

① Press the "**MODE**(◉)" key will put the SI-100 in the Low Alarm Value Mode.

② After press "**+**(⬆)" key, press "**+**(⬆)"key once more will increase the value and press "**-**(⬇)" key will decrease the value.
If press "**-**(⬇)" key without press "**+**(⬆)" key, the instrument will go back to Measurement Mode.

③ Press "MODE(◉)" key once will save setting value and go back to Low Alarm Value Mode.

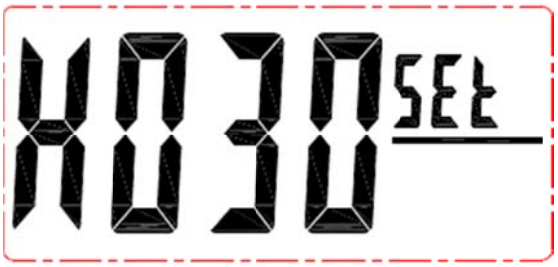


14. High Alarm Value Mode

① Press the "**MODE**(◉)" key will put the SI-100 in the High Alarm Value Mode.

② After press "**+**(⬆)" key, press "**+**(⬆)"key once more will increase the value and press "**-**(⬇)" key will decrease the value.
If press "**-**(⬇)" key without press "**+**(⬆)" key, the instrument will go back to Measurement Mode.

③ Press "MODE(◉)" key once will save setting value and go back to High Alarm Value Mode.



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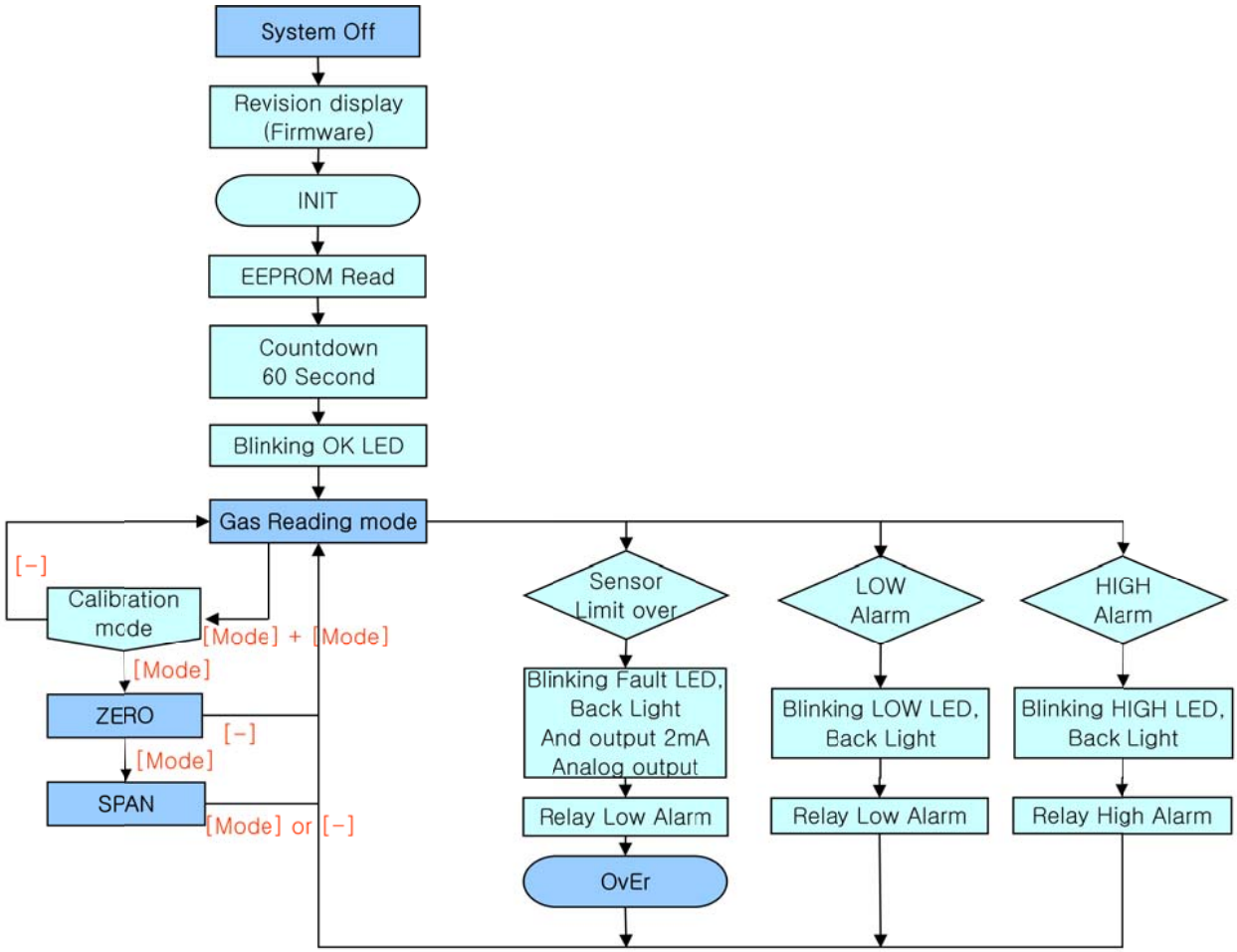
FLOW CHARTS

Primary Operation Sequence



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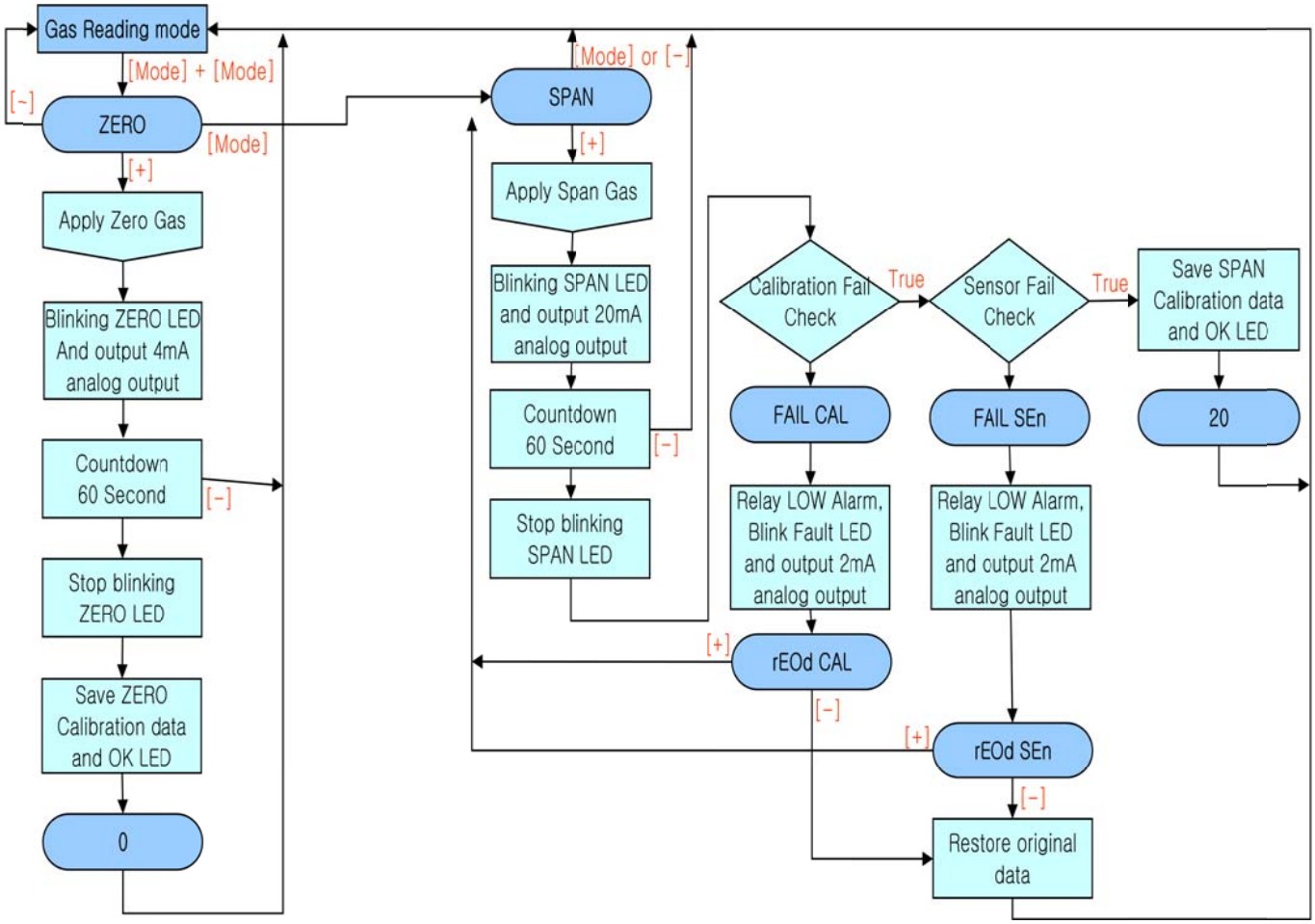
Zero/Span Calibration



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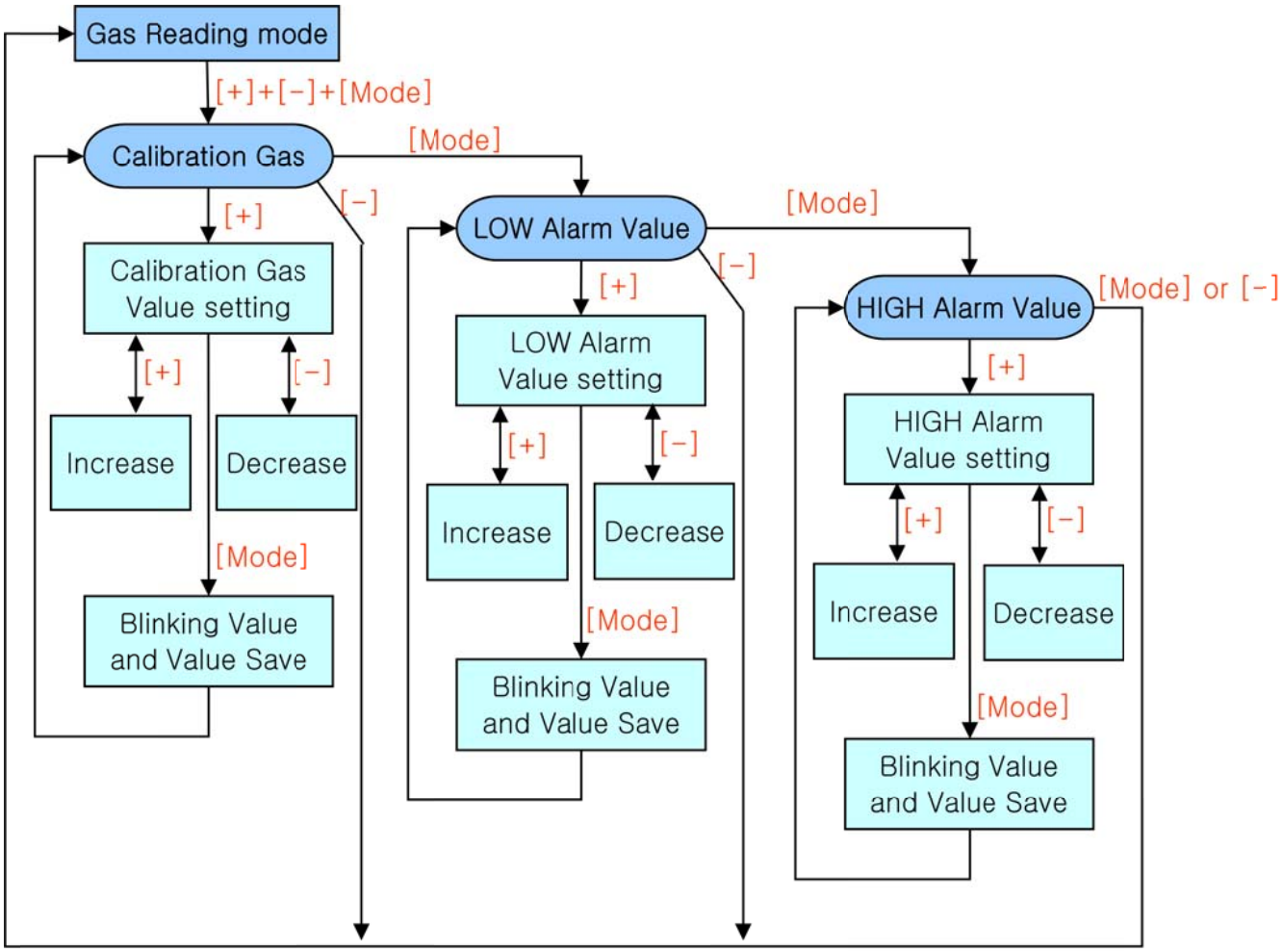
Calibration Gas, Alarm Value Setup



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Certificate

ktl 한국산업기술시험원
Korea Testing Laboratory

CERTIFICATE OF APPROVAL

Ref. Cert. No.
2008-1271-Q1

1 This certificate is issued for the equipment;
GAS DETECTOR
Model : SI-100
[DC 9~34 V, Max. 500 mA]

2 Manufactured and submitted for certification by;
SENKO Co., Ltd.
208. BI Center, Kangnung Univ, Jibyun-dong 123, Gangneung-si, Kangwon-do, Korea

3 This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the test report therein referred to.

4 KTL, being an Approved Certification Body in accordance with Article 33 of the Industrial Safety and Health Law and Article 27 of Enforcement Ordinance, Article 46 of Detailed Enforcement Regulation of the Law, confirms that the apparatus has been found to comply with the following Korean Standards;
Presidential Decree No. 2003-18 (Ministry of Labor)
and has successfully met the examination and test requirements recorded in confidential report number;
KTL Test Report No. 1454-569-2008

5 The code for the electrical apparatus is;
Ex d IIC T5 IP65 (-20 ℃ ... +50 ℃)

6 This equipment may be marked Designated Mark specified in Article 46-7 of Detailed Enforcement Regulation of the Industrial Safety & Health Law.

7 The validity of this certificate is until 21 October 2013.

Seoul, 22 October 2008

Approved by
Jun-gu, Kang

KOREA TESTING LABORATORY

FP251-03

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