MODEL: MGT

(Portable Multi Gas Detector)

User Manual

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Product Overview

MGT is a portable multi gas detector to warn the dangerous environment related to the gases. The detector indicates the concentration of 4 gases (oxygen, carbon monoxide, hydrogen sulfide, combustible gas) simultaneously on the LCD monitor. It is easy and simple to operate. The device alerts the workers of the danger by alarm, LED, vibration when the concentration exceeds the safety gas levels. The device shows the gas concentration in real time and identify the maximum and minimum concentration. The settings values can be modified through SENKO IR-LINK (option).

Warning

- Please do not replace or change the parts. In this case, we do not guarantee the warranty and safety even though it is under warranty.
- Please remove any debris on the surfaces of the sensor, LED or buzzer hole before use.
- Test the performance of the gas sensor through the gas beyond the alarm level regularly.
- Test the device on a regular basis whether its LED, alarm and vibration function properly.
- Use the device under the conditions instructed, including the temperature, humidity and pressure range. The use environment outside the instruction 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. Please make sure to calibrate the detector under the same or similar environment to the specification.
- Extreme changes in temperature may cause drastic changes of the gas concentration. (e.g. using the detector where there is a huge gap between the inside and outside temperature) Please use the device when the concentration becomes stable.
- Severe pressure or impact may cause drastic changes of the gas concentration. Therefore, please use the device when the concentration is stable. Severe pressure or impact may cause also malfunction in the sensor or the device.
- The alarms are set according to the international standard and must be changed by an authorized expert.
- Charging or replacing the battery should be done in a safe area where there is no risk of explosion or fire. Changing the sensor or battery with improper replacements, which are not authorized by the manufacturer, may invalidate the warranty.
  IR communication should be done in a safe area where there is no risk of explosion or fire.
- DO NOT expose the detector to poisons such as alcohol and citrus based products, as poisons may damage device's accuracy and response time.
- If you suspect sensor poisoning, please check such as calibration and bump.
- The detector is designed for use only in potentially explosive atmospheres where oxygen concentrations do not exceed 20.9% (v/v). Oxygen deficient atmospheres (<10% v/v) may suppress some sensor outputs.
- Recharge the battery before it is discharged.
- DO NOT charge the instrument in temperatures above or below the specified range of 0°C to

40°C

- The efficiency of the rechargeable battery decreases by approximately 20% after two years of normal use.
- Do not use any other charging adapter.
- Do not calibrate the device while or right after charging the battery.
- Do not calibrate if exposed to the condition representative of the IP rating.

Caution

- Please use after reading the manual carefully.
- The device is not a measurement device, but a gas detector.
- Please stop using and consult the manufacturer if the calibration fails continuously.
- Please test the device every 30 days under the atmospheric environment of clean air without gases.
- Clean the exterior of the device with soft cloth and do not clean it with chemical detergent.
- Only the combustible gas detection portion of this instrument has been assessed for performance by CSA Group.

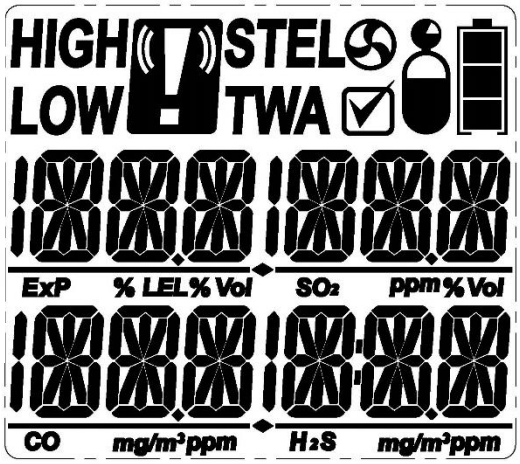
Reference

- For the flammable gas equipment installation, operation and maintenance information, please refer IEC 60079-29-2
- Conversion for %LEL and %vol follows ANSI/NFPA 497 standard.

Contents

1. Product Overview

1. Gas sensor (O_2)
2. Gas sensor (LEL)
3. Gas sensor (Dual : CO & H_2S)
4. Key
5. IR Port
6. Alarm LED
7. LCD display
8. Buzzer



LCD display symbols

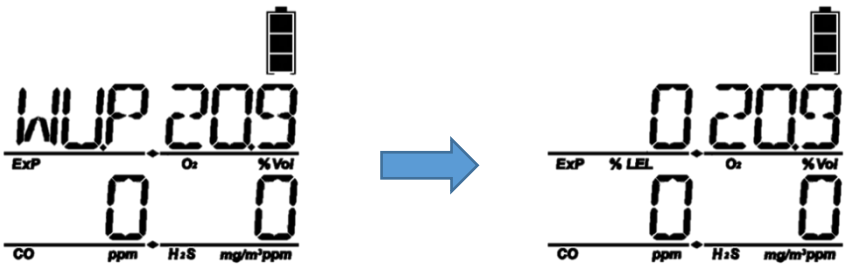
HIGH	High Alarm		Fresh Air Calibration
LOW	Low Alarm		Device Stabilization & Calibration Succeeded
	Alarm Condition		Standard Gas Calibration
STEL	STEL Alarm		Remaining Battery
TWA	TWA Alarm		

2 Activation

2.1. Switch On

Press and hold down the KEY button( ) and the device will be switched on along with the three seconds countdown.

(The device will be switched on only when you keep pressing the button for longer than three seconds.)



Initial Setting Mode **Gas Measuring Mode**

Once activated, the device will enter the warm up stage to stablize sensors. The warm up process is completed, the device is ready to detect gases. (MGT-P : ≤20s / MGT-N : ≤120s)

<Caution> To check the gas response performance of the sensor, it is recommended to do bump test with high concentration gas compared to alarm set point. It is recommended to do bump test before using the device at the work site. The user shall check whether the device is properly sensing the levels of dangers of gases and make sure whether the detecting section of the device is not blocked with materials impairing the detection.

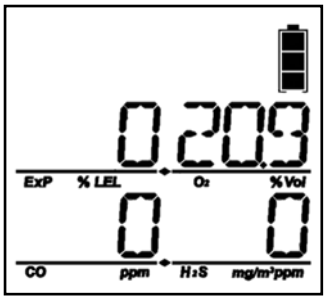
2.2. Switch Off

Keep pressing the KEY button( ) and the 3, 2 and 1 in the mentioned order will appear on the monitor and finally the device will be switched off.

(The device will not be switched off only unless you keep pressing the button for longer than three seconds.)

3. Mode

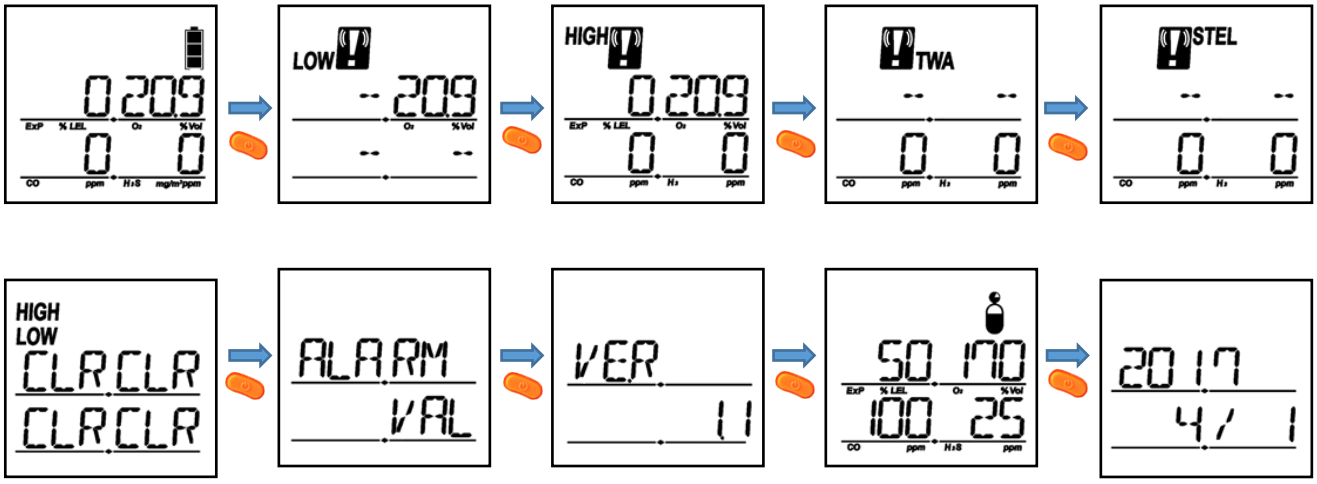
3.1. Measuring Mode



If the device goes into the normal measuring mode after stabilization, the gas concentration and the battery power level are displayed on the LCD monitor. Oxygen is displayed in %vol, combustible gases in %LEL and H_2S, CO in PPM unit. When the concentration levels change, the value is displayed in real time, and when the levels exceed the threshold for either LOW alarm or HIGH alarm (or TWA/STEL), the display icons of ***LOW***, ***HIGH***, ***TWA*** or ***STEL*** blinks regularly and the alarm, LED and vibration activates.

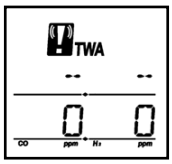
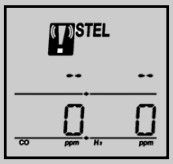
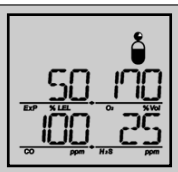
When the device goes to a safe area, the concentrations detected by the device declines and the alarm stops. Even after going to a safe area after the alarms set off, the icon of the alarm does not go away, and you must push the KEY button ( ) to make it go away.

3.2. Display Mode

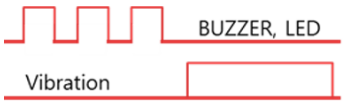
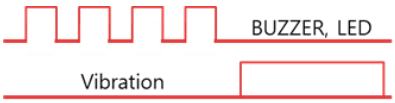
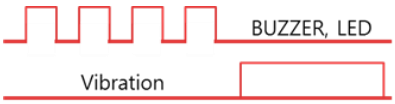
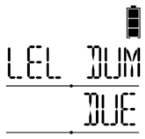
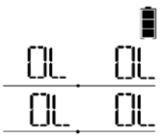
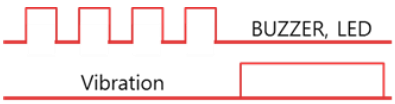
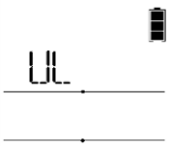


The displays in ten different modes as above are shown in the measuring mode every time when you press the KEY button( ).

3.2.1 Display Mode in Detail

LCD Display Images	***Description in Detail***
	➢ **Measuring Mode** (Basic Display) ➢ Display the current gas levels of the atmosphere and the battery power level
	➢ A minimum gas concentration detected by the device. *In an ambient air, the Oxygen level normally indicates 20.9%vol.
	➢ A maximum concentration detected by the device. *In an ambient air, the Oxygen level normally indicates 20.9%vol.
	➢ Acceptable hourly average exposure levels of the toxic gases for the last eight hours (Time Weight Average)
	➢ Acceptable average exposure levels of the toxic gases for the last 15 minutes (Short Term Exposure Limit)
	➢ Clear the previous Low, High (Peak), TWA, STEL values.
	➢ Check the current setting values manually. (Low alarm, High alarm, TWA, STEL)
	➢ Check the firmware version and type (N type or P type)
	➢ Check on set SPAN calibration levels ➢ Mode for ZERO calibration and SPAN calibration
	➢ Current Date and Time

3.3. Alarm Display

Type	Set-Off Condition	LCD Display	Alarm Sound & Vibration Display
LOW Alarm	Exceed LOW alarm value	LOW icon & gas concentration levels displayed	
HIGH Alarm	Exceed HIGH alarm value	HIGH LOW icon & gas concentration levels displayed	
TWA Alarm	When exceeding TWA alarm value	TWA icon & gas concentration levels displayed	
STEL Alarm	When exceeding STEL alarm value	STEL icon & gas concentration levels displayed	
Bump Test	Request Date for Bump Test		Stops after Bump Test
Execute Calibration	Request Date for Calibration		Stops after Calibration
Over Limit	Exceed Over Limit value		
Under Limit	Below Zero value		Stops after Zero Calibration

LOW Alarm Sets Off : When the user presses Key after noticing that the LOW alarm sets off, the sound stops, but the vibration and LED alarm remain.

HIGH Alarm Sets Off : The user must leave the area immediately, and the sound alarm/vibration/LED alarm stops when the device goes to a safe area where the concentrations are normal.

TWA Alarm Sets Off : The alarm sets off when the hourly average levels of the gas concentration for the last eight hours exceed the TWA concentration, and the sound alarm/vibration/LED alarm stop when the

gas concentration levels reach the alarm set-off value as the user goes to a safe area.
STEL Alarm Sets Off : The alarm sets off when the hourly average levels of the gas concentration for the last 15 minutes exceed the STEL concentration, and the sound alarm/vibration/LED alarm stop when the gas concentration levels reach the alarm set-off value as the user goes to a safe area.

Over Limit : When the detector is exposed over the upper limit range, it will display OVL (Over Limit) alarm on the LCD.

- P-Type : Once in OVL status, the alarm is maintained until the key is pressed.
- N-Type : If over limit occurs, keep alarm even after pressing button or power reset (OVL&ERR)
  After power reset, it will check stabilization when you click the button.
  (Please contact the manufacturer, if it does not enter the normal mode even if the key is pressed after a certain period of time after power reset)

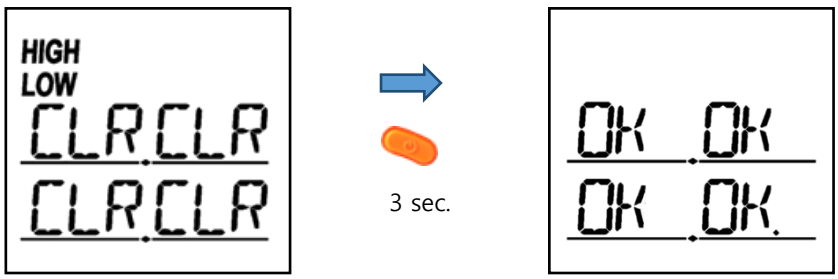
Under Limit : When the detector is below zero value, it will display UL(Under Limit) & Zero calibration warning on the LCD. When you proceed zero calibration, warning will disappear.
(MGT-P : From -1% ~ -6%, related number will be displayed in the LCD. From -7%, UL will be displayed.
MGT-N : UL will be displayed in the LCD.

Note)

- If a gas alarm occurs, quickly check the cause of the alarm and evacuate to a safe place, you should take appropriate action.
- The factory setting for gas alarms is non-latching. 1st and 2nd alarm, STEL/TWA also latching option setting can be changed using IR-LINK (option) in computer.
- Description of any suppression of indication cans be changed using IR-LINK(option) in computer.

***Bump Test Interval** (SENKO IR-LINK Options): Notices the user on a regular basis to check the device.*
***Calibration Interval** (SENKO IR-LINK Options): Notices the user on a regular basis to calibrate the sensor.*

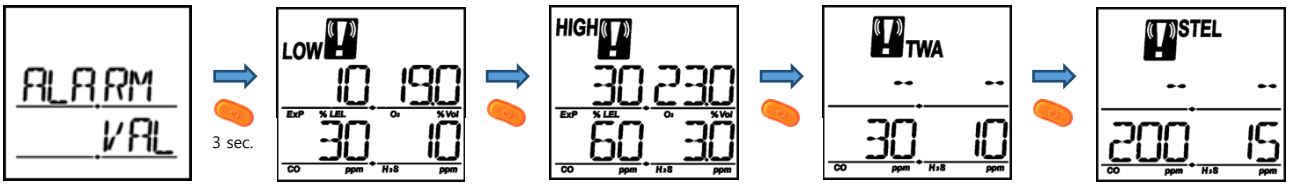
3.4. Initialization of detected concentrations



You can see the minimum and maximum values for the concentration levels detected by the device as well as the high TWA and STEL value on the display, and the values can be initialized. Press KEY button ( ) for three seconds on the CLR(Clear) mode on the LCD monitor, and the OK will appear on the LCD monitor

to notify the completion of the initialization.

3.5. Check on Alarm Value



Press the KEY button ( ) for three seconds under the ***ALARM VAL*** mode and the set value for the LOW alarm is displayed. Press the KEY button one time each to set the alarm set-off value for HIGH alarm, LOW alarm, TWA and STEL alarm in the mentioned order.

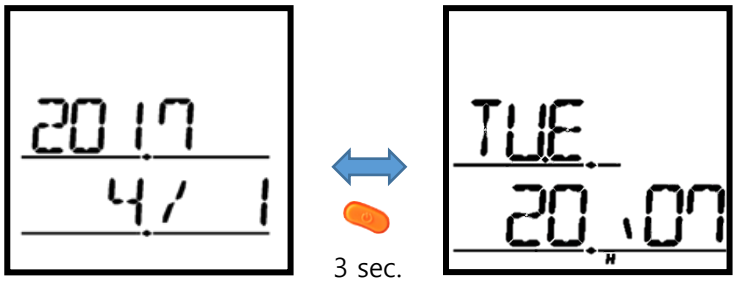
3.5.1 Initial Setting Concentration Levels

	Inflammables (Ex)	Oxygen (O_2)	Carbon Monoxide (CO)	Hydrogen Sulfide (H_2S)
LOW	10 %LEL	19%	30 ppm	10 ppm
HIGH	30 %LEL	23%	60 ppm	30 ppm
TWA			30 ppm	10 ppm
STEL			60 ppm	30 ppm

* The set values can be modified on PC through SENKO IR-LINK (options).

<Caution> The values of different gases in the device are set based on the international standards. As such, the alarm set-off values for each gas can be modified upon the approval and monitoring of the supervisor. The modification may be done through SENKO IR-LINK (options).

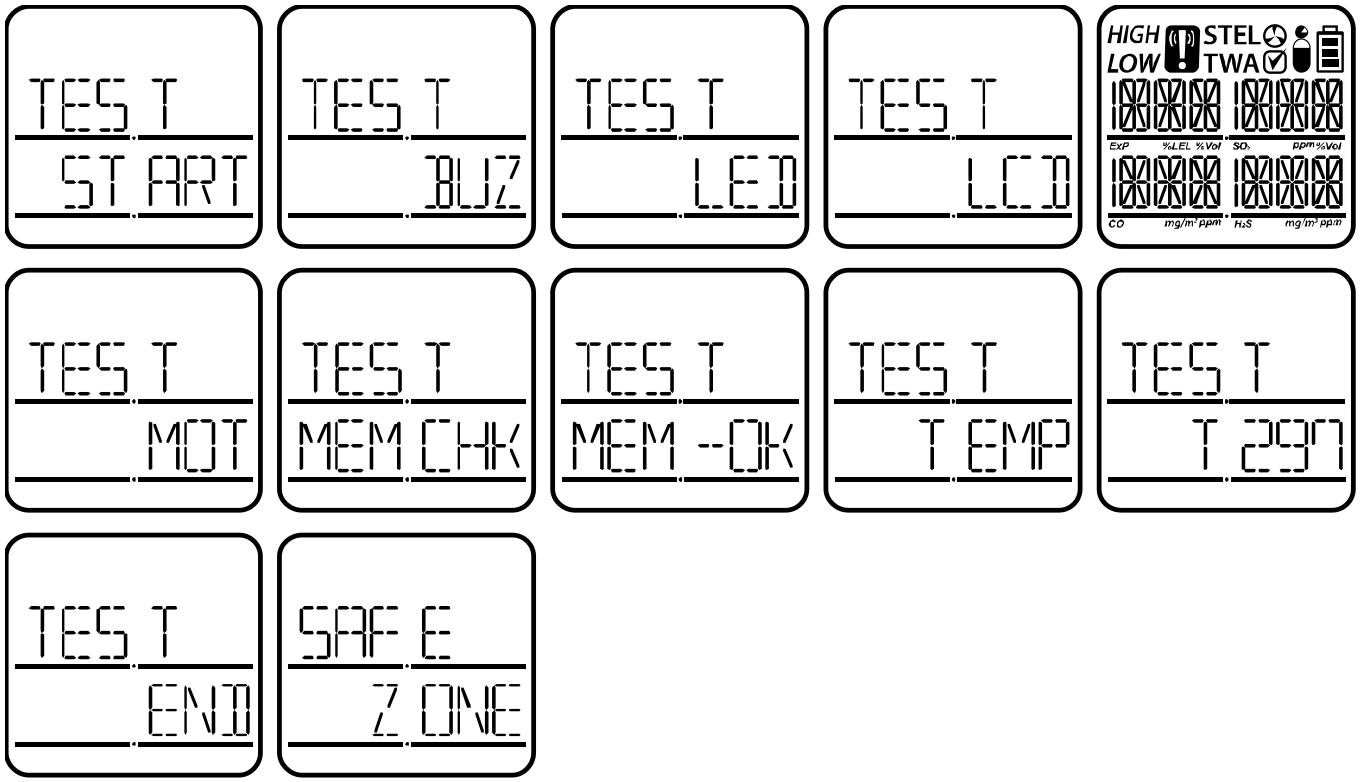
3.6. Dates and Time



Press the button ( ) under the (YY/MM/DD) mode for 3 seconds and the day/time mode will appear. Press the button ( ) again for 3 seconds under the (D/T) mode and it will go back to previous mode.

* The current time shall be automatically synched with that of the PC when linked with SENKO IR-LINK.

3.7. Self Test



Press and hold the button for 1 second in version on the display. The device will start the self test checking buzzer, LED, LCD, Motor, Memory, and Temperature.

4. Event Log

Up to 30 events may be saved and when the list exceeds 30, the oldest data will be automatically deleted. The saved data can be checked when transmitting it to PC through SENKO IR-LINK.

Data log records the operation status every second and normal data logs do not last more than 2 months.

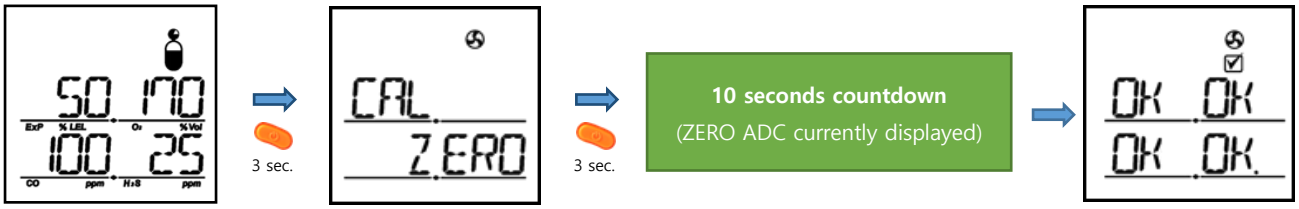
Log Categories	Log Details
EVENT(High, Low, TWA, STEL) Alarm	Occurrence time, Duration, Alarm Type, Gas Concentration, Serial Number
BUMP TEST Log	Test date, Pass/non-pass, Calibration Gas Concentration, Detected Concentration
Calibration Log	Date of the Calibration, Type, Calibration Gas Concentration, Detected Concentration
Data Log	Time, Date of executing IR-LINK, Concentration, Alarm Types, Options

5. Calibration

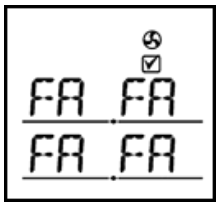
<Caution> The initial calibration is executed at SENKO CO. Ltd. before device release. The calibration values are saved in the device which means inaccurate calibration may impair the accuracy of the device performance. Normally, the calibration should be done once a year after the purchase and regularly every six months thereafter.

<Caution> Because it is calibrated on the assumption that oxygen concentration is 20.9%vol, the combustible gas is 0%LEL, and the toxic is 0ppm in the normal fresh atmosphere, fresh air calibration must be conducted in the absolutely clear air without any impact of other gases. Fresh air calibration in the airtight spaces therefore is not recommended. Make sure to avoid operation under the work environment where people may inhale gases.

5.1. Fresh Air Calibration

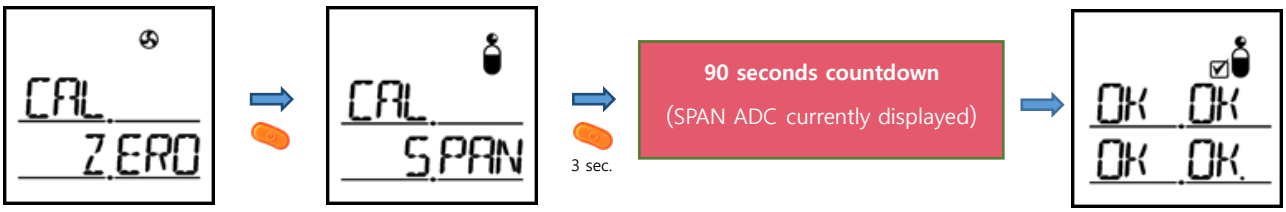


Press KEY button ( ) for 3 seconds under the gas calibration value mode and the icon ( ) signifying fresh air calibration will appear on the LCD monitor with the phrase "CAL ZERO." Press for another 3 seconds to do fresh air calibration and it takes 10 seconds to calibrate. Press the button during the calibration process to stop the calibration. If you press the button upon the completion, It will return to the fresh air calibration mode, and if you don't press the button, it automatically enters the measure mode.



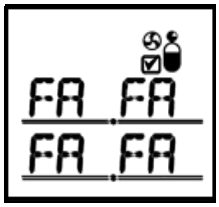
If the calibration fails, FA(Fail), not OK, appears on the LCD. Press the button to enter the initial fresh air calibration mode and it changes into the measure mode if you do not press the button for 3 seconds. If FA continues, please consult SENKO or the store you purchased as it may require the replacement of the sensor or repair of the device.

5.2. Standard Gas Calibration



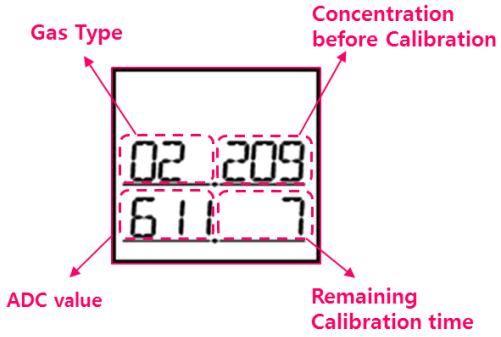
Press KEY button ( ) under the fresh air calibration mode and the icon ( ) signifying standard gas calibration will appear on the LCD monitor with the phrase "CAL SPAN." Press for 3 seconds to do the

standard gas calibration and it will be proceeded automatically in 90 seconds. When the count down starts from 90 seconds, supply standard gas at a flow rate of 400cc/Min using calibration cap. Calibration will be completed automatically after 90 seconds. Press the button during the calibration to stop. If you press the button upon the completion, It will return to the initial standard gas calibration mode, and if you don't press the button, it automatically enters the measure mode.



If the calibration fails, the phrase FA(Fail), not OK, appears on the LCD. Press the button to enter the initial fresh air calibration mode and if you do not press the button, it changes into the measuring mode. If FA continues, please consult SENKO or the store you purchased as it may require the replacement of the sensor or repair of the device.

Display for Calibration Count



Initial Standard gases concentration for calibration

	Combustible	Oxygen	Carbon Monoxide	Hydrogen Sulfide
Concentration	50%LEL (CH_4 2.5%vol)	17 %Vol	100 ppm	25 ppm

* The concentration for calibration may be modified on PC through SENKO IR-LINK (options).

Calibration Cap

Connect calibration cap with MGT and then proceed above standard gas calibration procedure (initial calibration needs 400 mL/Min flow rate)

Above accessories should be used in a safe place free from hazardous area such s explosion, fire condition.

Accessories is not intrinsic safety items

* List of Replacement component

- Sensor Filter / Calibration Cap / Battery / H2S&CO Dual Sensor / O2 Sensor / CH4 Sensor(Pellistor)

6. Specification

The detector with a pellistor sensor(MGT-P) will be continuously operated for more than 24 hours when fully charged. The detector with a NDIR sensor(MGT-N) will be continuously operated about 2 months when fully charged under normal operation condition.

6.1. Operating condition

Model	MGT			
Measure Gas	Combustible(CH_4)	O_2	CO	H_2S

Detecting Method	Diffusion			
Measure Mechanism	Catalytic (MGT-P) NDIR (MGT-N)	Electrochemical	Electrochemical	Electrochemical
Range	0~100 %LEL (or 0.0~5.0%Vol)	0~30 %vol	0~500 ppm	0~100 ppm
Sensor life	> 5 years	< 2 years	> 2 years	> 2 years
Response Time (T90)	N : < 50sec/90%scale P : < 30sec/90%scale	< 15sec/90%scale	< 30sec/90%scale	< 30sec/90%scale
Accuracy	± 3%/ Full Scale			
Resolution	1%LEL	0.1 %vol	1 ppm	0.1 ppm
Operation	Front Key			
Display	Digital LCD display, LCD Backlight, Indicator LED			
Alarm	Visual : LCD alarm display, LCD Backlight, Indicator LED Audible / buzzer (90dB at 10cm)			
Data Saving	Event Log : 30 EA, Calibration Log : 30 EA Bump Log : 30EA, Data log Two Months or longer			
How to Fix	Belt Clip			
Temperature	-20˚C ~ +50˚C			
Humidity	10 to 90% RH(Non-condensing)			
Pressure	80 ~ 120KPa			
Air velocity limits	Below 400m/min			
Ingress Protection	IP67 (IP ratings do not imply that the equipment will detect gas during and after exposure to those conditions)			
Battery Type	Manufacturer: SAMSUNG SDI, Product Name: ICP103450S, Type: Lithium-Ion Charger Nominal Voltage : 3.7V , Nominal Capacity: 2000mAh , Max Charging Voltage: 6.3V			
Battery Duration (=Operating Time)	(MGT-P : 24 Hours, MGT-N : 2 Months)			
Power consumption	MGT-P : 365mW MGT-N : 95mW			
Case	Rubber-base PC Case			
Size	(W x D x H) 60 x 40 x 118mm			
Weight	240 g			
Options	SENKO IR-LINK			
Certification	MGT-P : Ex d ia IIC T4 MGT-N : Ex ia IIC T4			

6.2. Storage condition

Model	MGT

Temperature	0 ~ 20℃
Humidity	15 ~ 90%RH (Non-condensing)
Pressure	90 ~ 110KPa
Shelf life	6months

6.3. Certification

√ FCC compliance

This device is tested according to FCC rules part 15 and comply with restrictions for the CLASS A digital device.

These restrictions are designed to provide adequate protection against industrial environment which have harmful interference when operated. This device generates, uses, and can radiate radio frequency energy and, if not follow the instruction manual for installation or usage, it may cause harmful interference to wireless communications.

	Certifications	Standards
IECEx	CSA 18.0001X Ex ia IIC T4 Ga (SP-MGT-N) Ex da ia IIC T4 Ga (SP-MGT-P)	IEC 60079-0: 2011 Ed. 6 IEC 60079-1: 2014-06 Ed. 7 IEC 60079-11: 2011 Ed. 6 IEC 60079-26: 2014 Ed.3
CSA&UL	CSA 18.70172674X Class I, Division 1, Group A, B, C, D, and T4 Class I, Zone 0, AEx ia IIC T4 Ga Ex ia IIC T4 Ga -20°C ≤ Ta ≤ 50°C (SP-MGT-N) Class I, Division 1, Group A, B, C, D, and T4 Class I, Zone 0, AEx da ia IIC T4 Ga Ex da ia IIC T4 Ga -20°C ≤ Ta ≤ 50°C (SP-MGT-P)	CAN/CSA-C22.2 No. 0-10:15 CAN/CSA-C22.2 No. 60079-0:15 CAN/CSA-C22.2 No. 60079-1:16 CAN/CSA-C22.2 No. 60079-11:14 CAN/CSA-C22.2 No. 60079-29-1:17 CAN/CSA-C22.2 No. 61010-1-12 ANSI/UL 913 Ed.8 ANSI/UL 60079-0 Ed.6 ANSI/UL 60079-1 Ed.7 ANSI/UL 60079-11 Ed.6 ANSI/UL 60079-29-1:2019 ANSI/UL 61010-1 Ed.3
ATEX	SIRA 18 ATEX 2059X CE0080 ⟨Ex⟩ II 1G Ex ia IIC T4 Ga (SP-MGT-N) Ex da ia IIC T4 Ga (SP-MGT-P) -20°C ≤ Ta ≤ +50°C	EN 60079-0:2012 EN 60079-1:2014, EN 60079-11:2012
INMETRO	BRA-19-GE-0021X Ex ia IIC T4 Ga (SP-MGT-N)	IEC 60079-0:2013 IEC 60079-1:2016 EC 60079-11:2013

	Ex da ia IIC T4 Ga (SP-MGT-P)	
KCS	17-KA2BO-0235X Ex ia IIC T4 (SP-MGT-N) 17-KA2BO-0236X Ex d ia IIC T4 (SP-MGT-P) -20℃ ≤ Ta ≤ +45℃	
FCC	SP-MGT-N SP-MGT-P	ANSI C63.4:2014 FCC Part 15 Subpart B (All other devices) ICES-003:2016 CAN/CSA-CISPR 22-10

7. Trouble-shooting

Problem	Possible Cause	Trouble-shooting
Can't do power on	Full discharge or Have no battery	Re-use after charging sufficiently
"ERR" on the LCD	Device's error	Re-start or Change the sensor
Can't measure Gas precisely	Need calibration or Contaminate sensor filter	Conduct calibration or Change, clean sensor filter.
Alarm on with no reason	Need calibration or Device's error	Conduct calibration or Change sensor
Calibration fail	Setting error or Device's error	Change sensor or Conduct calibration after setting
Can't do charging battery	Charger error or Device's error	Change battery or Check charger connection
Keep charging, can't charge 100%	Charging battery	Charging device after power off

Limited Warranty

SENKO warrants this product to be free of defects in workmanship and materials-under normal use and service-for two years from the date of purchase from the manufacturer or from the product's authorized reseller.

The manufacturer is not liable (under this warranty) if its testing and examination disclose that the alleged defect in the product does not exist or was caused by the purchaser's (or any third party's) misuse, neglect, or improper installation, testing, or calibrations. Any unauthorized attempt to repair or modify the product, or any other cause of damage beyond the range of the intended use, including damage by fire, lightening, water damage or other hazard, voids liability of the manufacturer.

In the event that a product should fail to perform up to manufacturer specifications during the applicable warranty period, please contact the product's authorized reseller or SENKO service center at 587-322-1616 to repair/return information.

SENKO Canada Ltd.

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Tel: 587-322-1616

Email: ben@senkocanada.com **Web**: www.senkocanada.com

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