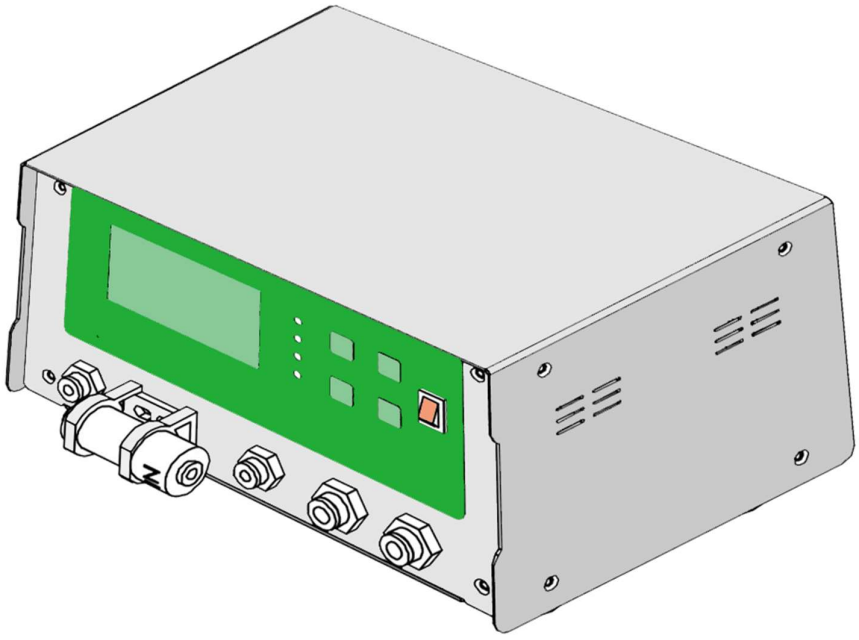
SENSECUBE
Sensing And Measurement Solutions

USER GUIDE

Gas Analyzer

SGA300 Series



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SENSECUBE is based on 20 years of sensor expertise and manufacturing experience, SENSECUBE provides solutions for sensing and measurement which optimized for customer's needs.

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CHAPTER 1

General

This chapter provides general notes on the manual and the product.

About Manual

This manual provides information on the use and maintenance of the "Sensecube" "Gas Analyzer SGA300" series.

Manual Contents

This manual is organized as follows.

- CAHPTER 1 : General information about the manual
- CAHPTER 2 : Product overview, Introduction "Gas Analyzer SGA300" series
- CAHPTER 3 : Installation information "Gas Analyzer SGA300" series
- CAHPTER 4 : "Gas Analyzer SGA300" series operation information
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Version information

Version	Explanation
Rev 1.0	initial deployment Manual

Manual

Version	Explanation
A2	SGA300 protocol

Document Rule

Important safety-related information throughout this manual is highlighted as follows:

WARNING	Warning of serious danger. Please follow the instructions. If you do not follow them carefully, there is a risk of injury or death.

CAUTION	Warning of potential risks. If you follow the instructions and do not follow the instructions carefully, It may cause damage or loss of important data.

NOTE	Displays important information about product usage.

Safety

WARNING

Do not modify the device. Improper modification may damage the product or cause it to malfunction.

This unit is not explosion-proof type. Do not use in an explosive gas atmosphere. It may be a risk of explosion, fire or serious accidents.

If piping is incorrect, gas may leak.
There is danger of personal injury by toxic gas, and explosion, fire by combustible gas.

When piping, use a pressure reducing valve to prevent overpressure the inside of device.
Excessive pressure may cause mechanical damage or gas leakage.

Do not apply excessive pressure to the gas inflow and outflow path of the device.
It may cause Gas leaks the inside of device, damage to the parts or not to be accurate measurements.

When piping, use the piping that does not contain oil or grease. If it is on the foreign objects, it may cause fire or other accidents.

CAUTION

Select a place where can withstand the weight of the device. If installed in an unsuitable location, there is a risk of injury due to rotation or dropping.

Secure the case so that it does not open before carrying it. Otherwise, the case may be separated and injured accordingly.

Be careful not to let foreign objects get inside the device. foreign objects penetrated can cause malfunction.

Connect all cables before applying power to the device, And check for power again.

Do not touch the device with wet hands.

Do not use replacement parts other than the specified parts. Otherwise, it does not provide equivalent performance.

NOTE

Do not touch the input / output terminals of the device with metal or fingers. It may cause electric shock or injury.

Do not use firearms near the unit.

Do not allow water to enter the device.

Check the filter for correct measurement and replace it periodically.

Warranty

This product has 2 years warranty under normal circumstances and conditions. However, the warranty may not be valid for any damage or failure due to unusual operating conditions, careless handling by the user, or unauthorized modification.

Filters that require periodic replacement or worn-out items with usage limit may be excluded from warranty.

CHAPTER 2

Product Overview

This chapter describes the features, benefits and product names of the "Gas Analyzer SGA300" series.

About "Gas Analyzer SGA300" series

"Gas Analyzer SGA300" series measures the concentration of sample gas.
For example, the concentration of carbon dioxide (CO2) gas in NDIR way, which is excellent in gas selectivity and long-term stability, and the concentration of oxygen (O2) gas that apply ZIRCONIA oxygen cell that is stable for a long time and is less dependent on temperature or external environment can be measured.

The configuration of the gas sensor can be variously configured according to the requirements.

A highly sensitive flow control pump and sensor are built in the device, measurements can be made with gas sampling at constant flow rates without the need to apply pressure or maintain constant flow rates.

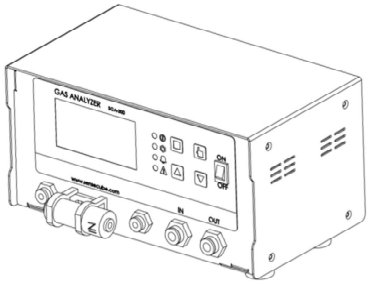
In addition, microprocessor built-in is easy to control device through LCD,
It is also possible to control by external communication, and it has analog output function for sensor output, so it can be used variously.

"Sensecube"s freely deployed Windows version of the data logging program "(SR100)" makes it easy to implement a data logging and analysis environment.

This device can be used in a variety of environments such as combustion control, physico-chemistry, plant research, and global atmospheric studies.

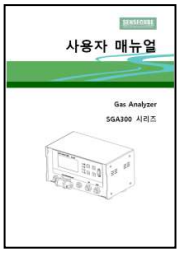
Product components

Basic composition



① Body

② Power adapter
(AC110~220 / DC24V)



③ User manual

The sensing area inside the main body may differ depending on the configuration specifications (detection gas, detection range, detection method, etc.).

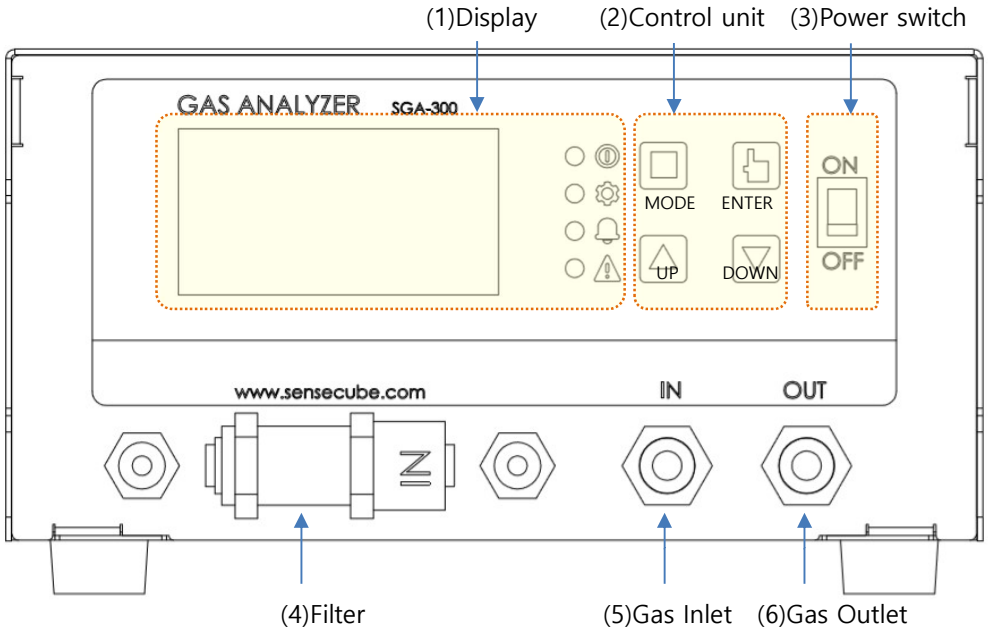
Sold separately

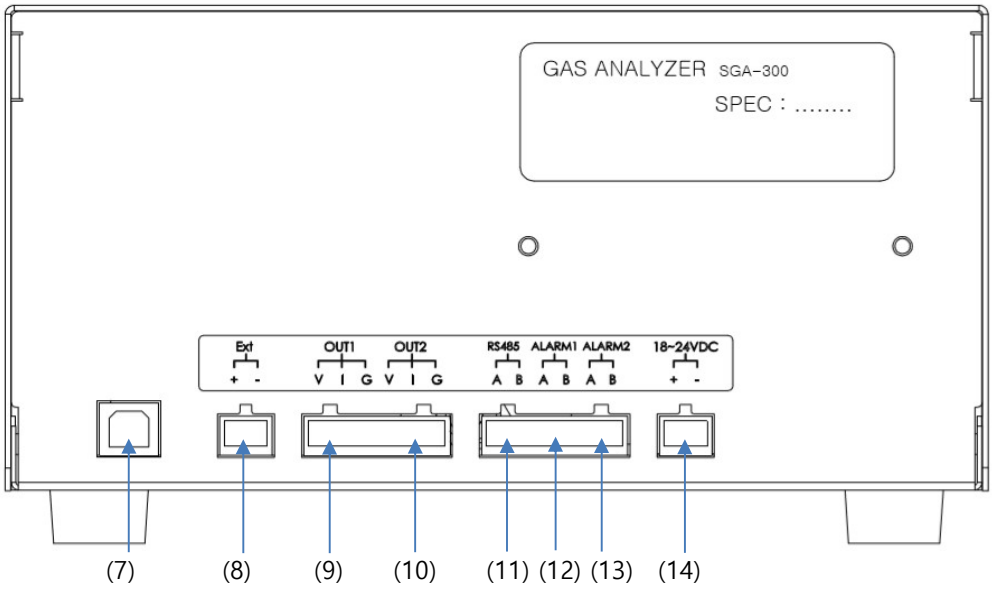
① USB to RS-485/UART Converter **KCD-TK100**

② SENSECUBE Logging program (Windows version) **SR-100**

If you want to log the sensing data of "SENSECUBE" product in Windows environment, you can purchase it separately.

Description of each part





(7) USB (Option), (8)External input (DC voltage)(Option)
(9) CH1 Analog output(CO_2), (10)CH2 Analog output(O_2)
(11) RS-485, (12)CH1 Alarm output(O_2), (13)CH2 Alarm output (CO_2)
(14) Power input

Name	Description
(1) Display	LCD display that allows to check measured values & setup information.
(2) Control unit	Button key arrangement for various operation settings.
(3) Power switch	Turn On/Off the device.
(4) Filter	Filter for removing impurities of gas.
(5) Sample gas inlet	Sample gas injection & connection port.
(6) Sample gas outlet	Gas discharge pipe connection port.
(7) USB (option)	USB for virtual serial communication for external communication.
(8) External Analog voltage input	Port for connecting sensor of external analog voltage output.
(9) CO2 Analog output	Analog voltage / current output port, according to CO2 concentration.
(10) O2 Analog output	Analog voltage / current output port, according to O2 concentration.
(11) RS-485	Port for RS-485 communication for external communication.
(12) CO2 Alarm output	Relay contact output for alarm output, according to CO2 concentration.
(13) O2 Alarm output	Relay contact output for alarm output, according to O2 concentration.
(14) Power input	Port for connecting the power input line.

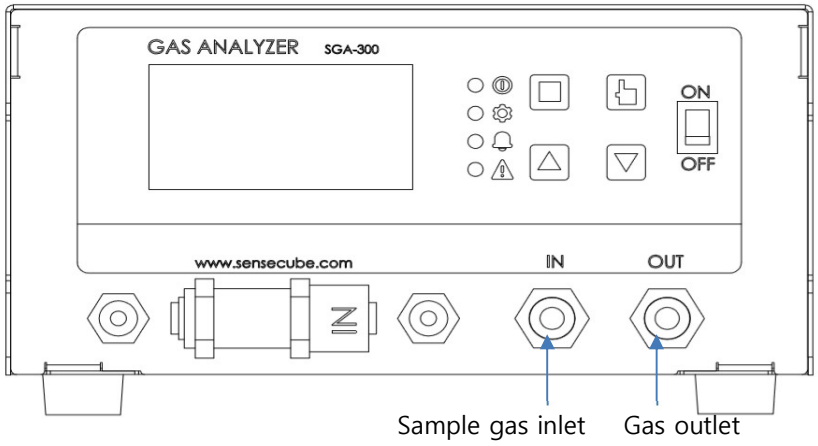
CHAPTER 3

Install

This chapter provides information on how to install the "Gas Analyzer SGA300" series in various situations.

Piping

- Tubes should be connected to the sample gas inlet and outlet each on the body front panel.
- Use a corrosion resistant tube such as Teflon or polyethylene. In the case of rubber or vinyl tube, the gas may be adsorbed inside the piping and the detected value may become inaccurate.
- The length of the tube should be shortened to the quick measurement response and so that the load on the pump motor is minimized.
- Tube with an outer diameter of ø6 mm and an inner diameter of ø6 mm is recommended.
- If dust enters the device, it may cause operational errors. Use clean tubes and couplings as well as filters.



For inhalation of sample gas, dehumidify pretreatment gas should be inhaled in. The gas flow rate is set at about 500 ml/min inside the device pump.
If a separate gas injection device is connected from outside the device, the gas flow rate should be maintained at about 500 ml/min.

Sampling Gas

(1) Sampling Gas condition

- Although the device is equipped with filter, remove the dust contained in the sampling gas beforehand for the life and stability of the filter.
  Check the filter of the device for contamination and periodically replace it.
- The dew point temperature of the sample gas should be lower than the ambient temperature to avoid dew inside the device. If the sample gas contains moisture, lower the dew point temperature to 0°C by removing moisture.
- In the case of gas containing impurities such as SO3 dust, remove dust or impurities with cooler and dust filter.
- If the sample gas contains a large amount of highly corrosive gas such as CI2, F2 or HCI, the device life is shortened. Do not use for corrosive gas.
- The temperature of the sample gas can be used in the range of 0 ~ 50℃.
  Be careful not to let hot gas directly into the device.

(2) Sampling gas flow rate

- When sampling gas is injected, keep the flow rate at 500 ml/min.
  If no additional injection is made, the air pump inside the device is set to automatically maintain a flow rate of about 500 ml/min.

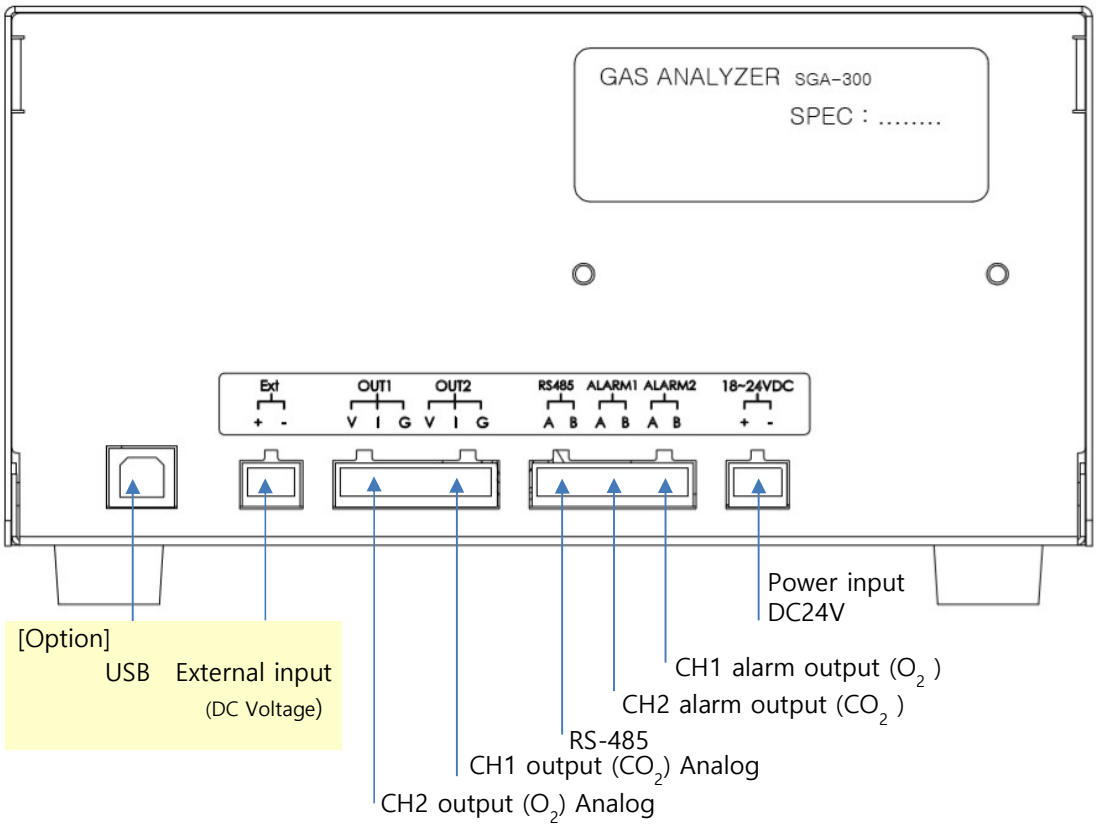
(3) Sampling gas discharge pressure

- The sampling gas outlet maintains atmospheric pressure to prevent gas backflow.

Wiring

CAUTION	To prevent electric shock or electrical damage to equipment, be sure to wiring should be done with the main power OFF. The wire must withstand the rating of the device. If you use wires that can not withstand the rating, It may cause fire break out. Use a rated power supply. If you connect a power supply with the wrong rating, It may cause equipment failure.

Each external terminal is provided on the back panel of the device



(1) Power input

NOTE	Power supply that can be a source of noise, install the unit away from each other. Electrical devices and power lines that generate noise install separate the communication line and signal completely. If there is noise from the relay, solenoid valve, motor, etc. to the power supply, install a varistor or spark killer nearest to the source of noise to prevent malfunction due to noise.

"Gas analyzer SGA300" series uses DC 18 ~ 28V power supply.

Connect the power line to the (+/- polarity) shown on the panel.

(2) CH1, CH2 alarm output

- It provides relay contact output which is turned on when the detected value is out of user's setting range. (Contact Rating: 1A 24VDC or 1A 125VAC)

(3) RS-485, USB(option)

NOTE	For RS-485, you can connect multiple devices, In an environment with high electrical noise, If the distance between SGA300 and HOST system is long, Connect a 120Ω termination resistor, so as not to RS-485 driving current is insufficient

- Supports communication interface for device monitoring and configuration control.
- Refer to separate document for communication protocol.

(4) CH1, CH2 Analog output

- Analog output can change the output range by user setting.
- All analog output signals of the device are not insulated.
- Output signal: Current 4~20mA, 0~20mA, 0~24mA, Voltage 0~5V, 0 ~ 10V

(5) External analog voltage input (option)

- By synchronizing measurements with other sensors that support analog voltage output, it is analog voltage input port for output to communication interface.
- Input range: ± 10VDC

CHAPTER 4

Management

Preparing

- Please check that the tube is properly connected to the sampling gas inlet and outlet.
- Please check that the wiring necessary for the device is properly connected

Sequence

(1) Turn on the power switch on the right side of the front panel.
When power is applied, the device initialization and internal pump starts to operate.
The measured values can be checked on the LCD screen of the front panel within a few seconds.

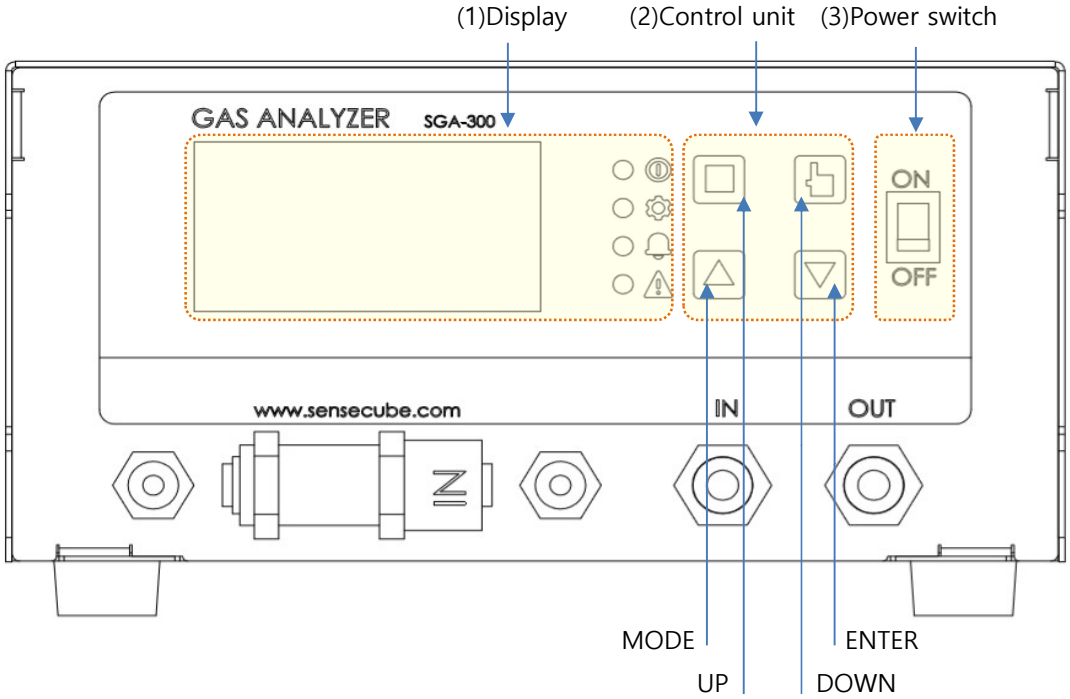
(2) Stable time is required depending on the surrounding environment for accurate measurement.
The power must remain on until performance stabilizes.

(3) Setting various setting values
Analog output range / RS-485 communication ./ Alarm range /
Measurement cycle / Pump operation time can be set according to user's environment.

CHAPTER 5

Operation

Panel name & description.



Display : LCD with measured values and setting items, and it consists of LED for power status, operation status, alarm and error display.

Control unit: Configuration is as follows.

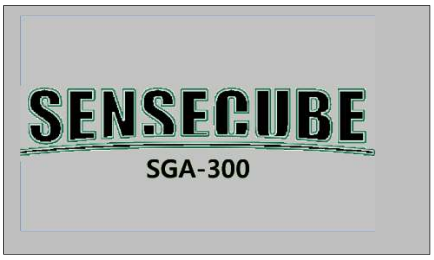
Used to move the menu or change the setting value.

Name	Description
MODE Key	Enter setting mode or return to previous screen.
ENTER Key	Applies the selected item.
UP Key	Used to move the menu or change the setting value.
DOWN Key	Used to move the menu or change the setting value.

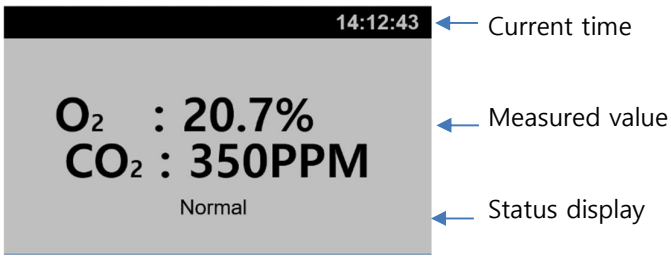
NOTE	If there is no key input for a certain time, it is automatically turned off for Backlight of LCD life protection. However, if there is a key input, the backlight is turned on again.

Booting Screen

When the device is powered on, the booting screen appears, and after booting, it switches to the measurement display screen.



Booting screen



Measured value display screen

Measured value display screen

The measured value display screen is the basic screen of the device.

For status display, refer to the following.

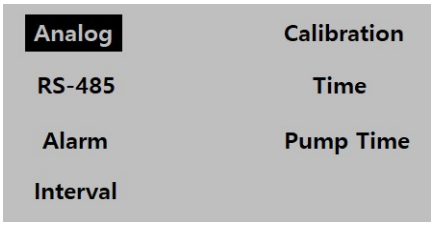
Status	Description
Normal	Usually displayed when the device status is normal.
Sensor Fail	Appears when the O2 or CO2 sensor inside the unit is not responding.
Intake Fail	Displayed when the flow rate in the tube is not maintained at 500mL/ min.
O2 Alarm	The O2 value is displayed if it is out of range set by the user.
CO2 Alarm	The CO2 value is displayed if it is out of range set by the user.

Setup mode display screen

Each time you press the 'MODE key', the 'Setup mode display' and 'Measured value display' is switched alternately.

Able to Select the setting menu by using UP or DOWN key in setting mode display screen.

Able to switch to the detailed setting screen for each menu by pressing the Press the 'ENTER key' in the selected setup menu.



Setup mode display screen

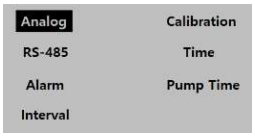
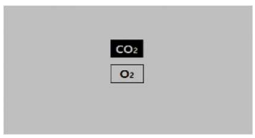
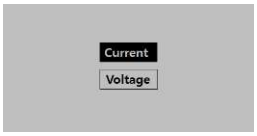
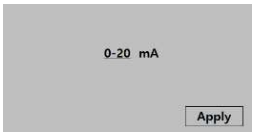
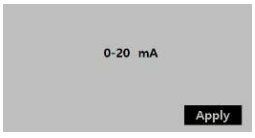
Setup change

Analog

You can change the analog output voltage range according to the sensor concentration of the device.

For change method, refer to the following.

- Current output range: 0~20mA, 4~20mA, 0~24mA
- Voltage output range: 0~5V, 0~10V

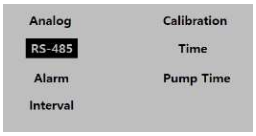
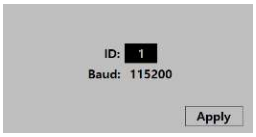
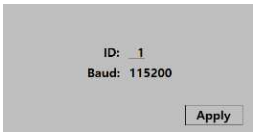
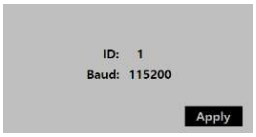
Screen	Description
	Press the MODE Key(▣) on the measured value display screen to move to the setting mode display screen.
	On the setting mode display screen, use the UP / DOWN Key Key(△▽) to select the Analog menu, and press the ENTER Key(☜) You can select the gas you want to change the output setting. Press the MODE key(▣) to return to the measurement value display screen.
	On the gas selection screen, use the UP / DOWN Key(△▽) to select the gas to set the output range, and then press the ENTER Key(☜) move to the screen to select current / voltage. Press the MODE key(▣) to return to the setting mode display screen
	On the current / voltage selection screen, select the voltage or current using the UP / DOWN Key(△▽), and press the ENTER Key(☜) to move to the screen to select the output range. Press the MODE key(▣) to return to the gas selection screen.
	On the output range selection screen, Select the range using the UP / DOWN Key(△▽), and press the ENTER Key(☜) to move to the screen to select the output range. Press the MODE key(▣) to return to the current / voltage selection screen.
	When the output range is changed to selectable range, use UP / DOWN Key(△▽) to change the output range, and then Press the ENTER Key(▣)to return to the selected state.
	Use UP / DOWN Key(△▽) to move to Apply, and press ENTER Key(☜) to apply the changed setting, and return to the measurement display screen.

RS-485

You can change RS-485 communication speed and ID address of Modbus RTU device.

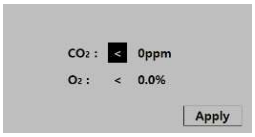
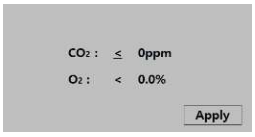
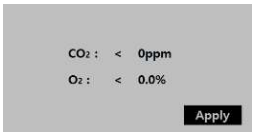
- Modbus RTU ID Address range : 1~31
- RS-485 communication Speed : 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, 115200bps

NOTE	RS-485 setting change is different from other setting change. Applying setting change will reboot the power of device.

Screen	Description
	Press the MODE Key(▣) on the measured value display screen to move to the setting mode display screen.
	Select RS-485 menu using UP / DOWN Key(△▽) on the setting mode display screen, and press the ENTER Key(☜) to move to the screen to change RS-485 Baud Rate and ID. Press the MODE key(▣) to return to the measurement value display screen.
	In the RS-485 setup menu, use the UP / DOWN Key(△▽) to select ID or Baud, and press the ENTER Key(☜) to change the setting. Press the MODE key(▣) to return to the setting mode display screen.
	After changing the value with the UP / DOWN key (△▽), Press the ENTER Key(☜) to return to the selected state.
	Use UP / DOWN Key(△▽) to move to Apply, and press ENTER Key(☜) to apply the changed setting, and the device will reboot.

Alarm

You can specify the alarm setting range according to the measured value.

Screen	Description
	Press the MODE Key(□) on the measured value display screen to move to the setting mode display screen.
	On the setting mode display screen, use the UP / DOWN Key(△▽) to select the Alarm menu, then press the ENTER Key(☜), Moves to the screen where you can change the alarm setting range for each measurement gas. Press the MODE key(□) to return to the measurement value display screen.
	Use the UP / DOWN Keys(△▽) in the Alarm Setup menu to select the gas setting boundary value or over / under, and press the ENTER Key(☜) to switch to the setting changeable state. Press the MODE key(□) to return to the setting mode display screen.
	After changing the value with the UP / DOWN key (△▽), Press the ENTER Key(☜) to return to the selected state.
	Use UP / DOWN Key(△▽) to move to Apply, and press ENTER Key(☜) to apply the changed setting, and return to the measurement display screen.

Interval

You can set the cycle for performing gas sampling

Cycle selection range : 0min, 5min, 10min, 20min 30min,

0hour, 1hour, 2hour, 3hour, 4hour

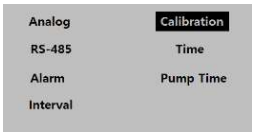
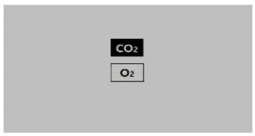
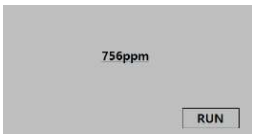
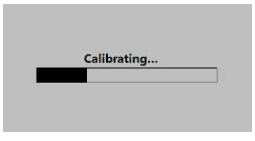
0min and 0hour are continuous sampling.

Screen	Description
	Press the MODE Key(▣) on the measured value display screen to move to the setting mode display screen.
	Pressing the ENTER key(☜) with the Interval menu selected using the UP / DOWN Key(△▽) on the setting mode display screen will move to the screen where you can change the gas sampling cycle. Press the MODE key(▣) to return to the measurement value display screen.
	Use the UP / DOWN Key(△▽) in the Interval setting menu to select minutes / hours or time digits and press the ENTER Key (☜) to change the setting. Press the MODE key(▣) to return to the setting mode display screen.
	After changing the value with the UP / DOWN key (△▽), Press the ENTER Key(☜) to return to the selected state.
	Use UP / DOWN Key(△▽) to move to Apply, and press ENTER Key(☜) to apply the changed setting, and return to the measurement display screen.

Calibration

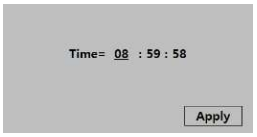
Calibration of the oxygen or carbon dioxide sensor of the device can be performed.

NOTE	please maintain 500ml/min, when calibrating through a gas flow meter.

Screen	Description
	Press the MODE Key(▣) on the measured value display screen to move to the setting mode display screen.
	Select the calibration menu using the UP / DOWN Key(△▽) on the setting mode display screen, and press the ENTER Key(☜) to move to the screen to select the gas to calibrate. Press the MODE key(▣) to return to the measurement value display screen.
	Use the UP / DOWN Keys(△▽) in the gas selection menu to select the gas to calibrate, and press the ENTER Key(☜) to move to the screen where calibration can be performed. Press the MODE key(▣) to return to the setting mode display screen.
	If you move to the screen where you can perform calibration, use the UP / DOWN Key(△▽) to select the calibration gas concentration, and Press the ENTER key(☜) to change the calibration gas concentration. Press the MODE key(▣) to return to the setting mode display screen.
	When the calibration gas concentration can be changed, use the UP / DOWN Key(△▽) to change the value to the calibration gas concentration to be supplied, then press the ENTER Key(☜) to return to the selected state.
	After setting the calibration gas concentration value, use UP / DOWN Key(△▽) to move to RUN, and press ENTER Key(☜) to start calibration and move to Calibration progress screen.
	The progress of the calibration is indicated by the color change of the status bar. When the calibration is completed, move to the measurement display screen.

Time

You can change the current time displayed in the upper right of the measurement display screen.

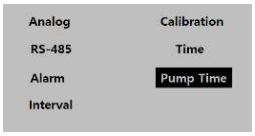
Screen	Description
	Press the MODE Key(□) on the measured value display screen to move to the setting mode display screen.
	Pressing the ENTER key(□) with the Time menu selected, using the UP / DOWN key(△▽) on the setting mode display screen will move to the screen where you can change the current time. Press the MODE key(□) to return to the measurement value display screen.
	Use the UP / DOWN Key(△▽) in the time setup menu to select the hour / minute / second time number, and press the ENTER Key(□) to change the setting. Press the MODE key(□) to return to the setting mode display screen.
	When the setting is changed, press the UP / DOWN Key(△▽) to change the value, and then press the ENTER Key(□) to return to the selected state.
	Use UP / DOWN Key(△▽) to move to Apply, and press ENTER Key(□) to apply the changed setting, and return to the measurement display screen.

Pump Time

You can change the time pump operates during interval operation.

Pump operating time selection range : 30sec, 1min, 2min, 3min.

NOTE	If the interval setting is 0min or 0hour, continuous operation is performed regardless of the pump operation time setting.

Screen	Description
	Press the MODE Key(□) on the measured value display screen to move to the setting mode display screen.
	Pressing the ENTER Key(⏎) with the Pump Time menu selected, using the UP / DOWN Key(△▽) on the setting mode display screen will move to the screen where you can change the pump operation time. Press the MODE key(□) to return to the measurement value display screen.
	Use the UP / DOWN Key(△▽) in the Pump Operation Time Setting Menu to select the operating time, and press the ENTER Key(⏎) to change the setting. Press the MODE key(□) to return to the setting mode display screen.
	When the setting is changed, press the UP / DOWN Key(△▽) to change the value, and then press the ENTER Key(⏎) to return to the selected state.
	Use UP / DOWN Key(△▽) to move to Apply, and press ENTER Key(⏎) to apply the changed setting, and return to the measurement display screen.

CHAPTER 6

RS-485 connection

Device connection

In case of general-purpose PC without RS-485 dedicated port, connect PC and Gas Analyzer through USB to RS485 Converter.

RS-485 setting

If you connect RS-485 to a general-purpose PC, or if you use a separate RS-485 controller, basic settings for communication are required as shown below.

Setting	Value
Bauds	115,200 bps
Parity	None
Data bits	8bit
Stop bits	1bit
Flow control	None

Protocol

RS-485 communication of SGA300 series conforms to MODBUS RTU standard interface method. Please refer to separate document for protocol definition.

CHAPTER 7

Maintenance

Cleaning

- Clean with a soft, lint-free cloth moistened with mild detergent.
- If the filter on the front of the device is discolored or dirty, replace it..

Keeping

- Please clean it before storing.
- Take care not to allow foreign matter to enter the inlet and outlet of sample gas.
- Do not allow dust or water to enter the device.

Technical support

- Additional technical support is available at info@koreadigital.com with the following information.
- Model name and symptoms.
- Information about the surrounding environment using the device.
- Product purchase time.
- About the company or dealer who purchased the product.
- Contact information.

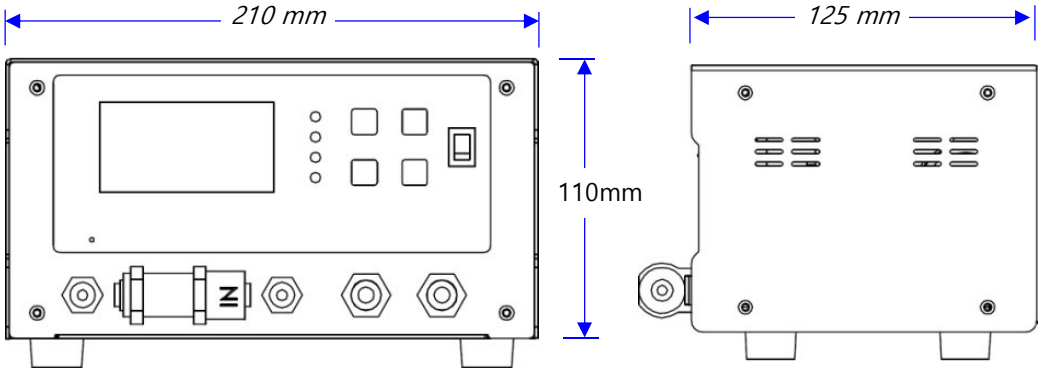
CHAPTER 8

Technical data

Item		CO_2 (CH1)	O_2 (CH2)	Remark
Measurement Type		NDIR	Electro-chemical	
Measuring Range		0~10,000ppm	1~95%	Optional
		0~10%	1~25%	
		0~20%		
Accuracy		±(3%F.S + 2% Reading)		@25℃, atmosphere
Degradation capability		DAC14bit 0.1ppm		
General	Response Time	Within 30 seconds	Within 1min	@ τ63%
	Sensor lifetime	About 5 years	About 5 years	Dry atmospheric conditions
	Operating temp.	-0 ~50℃		
	Operating humidity	~ 95%RH (Under Non-condensing)		
Main Function	Pump control (OPTION)	Pump (Setting operating time)		
		Pump (Setting operating cycle)		
	Calibration	1 Point SPAN adjustment		
	Interface			
Air Line	Pump flow	500ml/min		PUMP is Option
	Pump life time	8,000hrs		
	Tube	OD 6.35mm usable		
Electrical	Power Supply	DC24VDC		
	Current consumption	Average 400mA		Depending on sensor configuration
	Communication	RS-485 (Modbus RTU)		
Appearance	Filter	Able to replacement		
	Body	210mm x 110mm x 125mm		
	Protection degree	IP54		Indoor use
	Weight	About 2.5kg		Excluding external power source

* Life expectancy is subject to dry atmospheric conditions and may vary depending on the operating environment and the management level.
* Consumption current may vary depending on sensor configuration.
* Gas pressure at the inlet of GAS should be less than 20 psi.

Appearance



※ Images and specifications are subject to change without notice for performance and quality improvement.

Warranty

Thank you for purchasing "Sensecube" products.

This product has passed strict inspection by 'Korea Digital Corporation's strict quality control system. If there is a manufacturing defect or a natural breakdown within the warranty period, please contact the place of purchase or our customer support center.

Product Name		**Gas Analyzer**	**Model Name**	**SGA300**	
Purchase date			**Warranty**	**2 years**	
Store	**Name**		**Tel.**		
	Address				
Customer	**Name**		**Tel.**		
	Address				

Quality Assurance Regulations

1. During the warranty period, while using under the specified environmental range, if the product is malfunction due to defects, we will repair it free of charge. (Except for expendable electrodes and accessories)

2. Compensation criteria for repairs and exchanges are subject to the Economic Planning Board Notice of Compensation for Consumer Damage.

3. In the case of each of the following items, it do not apply to the provisions of free warranty.
   - In the event of performance failure and malfunction after the warranty period has elapsed.
   - If a malfunction occurs due to intent or negligence of the consumer.
   - In the event of a failure occurring due to arbitrary improvement or modification of the structure, performance and functions of product.
   - In the event of a product malfunction or defect due to natural disasters.

4. Even if the warranty period of the product has passed, you can get A/S at actual expenses.

Korea Digital Co., Ltd