



# GTD-5000

## Instruction Manual

---

Revision: 1



*For proper use, please read this manual thoroughly prior to operation*

## Thank you for purchasing our GASTRON's product.

Gastron is a specialized company in producing gas detector and gas monitoring system. We have been recognized by customers for our best quality products and excellence in easy-to-use design. We are striving to provide the suitable product that fits customer's needs, and continuously put every effort to develop better gas detector to satisfy customer's requirements. From now on, we will be your reliable partner to shed a bright light on your concern about gas detector. Please contact us if you have any question. You can obtain best solution from us with great satisfaction.

This instruction manual describes how to operate GTD5000 gas detector for proper use. It also simply explains how to maintain and repair the GTD5000. Please keep this manual safe after reading it thoroughly, because this manual will be of great help when you have any trouble or question during you are using the product.

If you have any problem in using our product, please contact us as follows:

➤ **Address :**

**18-8, Dogeumdanji 1-gil (Palgok 2-dong), Sangrok-gu, Ansan-si, Gyeonggi-do, Korea**

➤ **Tel : 031-490-0800**

➤ **Fax : 031-490-0801**

➤ **URL : [www.gastron.com](http://www.gastron.com)**

➤ **e-mail : [gastron@gastron.com](mailto:gastron@gastron.com)**

### **Note**

- You are recommended that your gas detector be inspected and calibrated with calibrating gas prior to using it.
- Without getting calibrated, the device might be malfunctioned due to sensor aging problem.
- In case of replacing this device, qualified technician of gas detector should perform the replacement to make sure that this procedure is done in the safest way possible.
- For details about maintenance and calibration of gas detector, please contact our technical department, send us email or visit our web site.

This page intentionally left blank

# TABLE OF CONTENTS

1. Introduction.....	6
2. Structure.....	6
3. Specification .....	7
4. Name and Functional Description of Components.....	8
4.1. Composing Elements .....	8
4.2. Disassembly Diagram.....	9
4.3. Functional Description of Components.....	9
4.4. Front Viwe of LCD Layout.....	11
5. Menu Table.....	12
6. How to Operate.....	15
6.1. Check Power Wiring .....	15
6.2. Power On.....	15
6.3. Gas Measuring State (Measuring Mode).....	16
6.4. Environment Configuration(Configuration Mode) .....	17
6.5. Program setting.....	19
6.6. Zero Calibration.....	20
6.7. Span Calibration .....	21
6.8. Alarm Data Setting (Alarm mode) .....	22
6.9. Current Time Reading and Setting.....	26
6.10. Checking and Setting Sensor Data .....	27
6.11. Test Function Setting.....	29
6.12. Flow Setting.....	31
6.13. Maintenance Mode Setting.....	32
6.14. Network Setting.....	35
7. Error & Warning Message (Troubleshooting).....	37
7.1. Error Code.....	37
7.2. Warning Code .....	37
8. Communication Interface .....	38
8.1. 4~20mA Output Current.....	38
8.2. 485 MODBUS Interface.....	38

8.2.1. RS485 Communication Configuration .....	38
8.2.2. Address Architecture .....	38
8.3. MODBUS/TCP Interface .....	39
8.4. Terminal Board Connector Layout.....	42
8.5. Terminal Board Connector Detailed Description.....	43
8.5.1. Power & Output Signal Terminal(CN1).....	43
8.5.2. RS485 & Relay Contact Terminal(CN3).....	43
9. Connector Wiring Diagram.....	44
9.1. Power and 4-20mA Signal Connection .....	44
9.1.1. Power and 4~20mA Source Connection.....	44
9.1.2. Power and 4~20mA Sink Connection .....	44
9.2. Alarm signal connection.....	45
9.3. RS-485 Communication Signal Connection.....	45
9.4. Ethernet Signal Connection .....	46
9.4.1. Connection in case of using PoE.....	46
9.4.2. PoE Connection in case of using Pyrolyzer option .....	46
9.5. How to Connect the Gas Detector to Control Units .....	47
10. Appearance and Dimensions.....	48
10.1. GTD-5000 Appearance and Dimensions .....	48
10.2. GTD-5000 & PY-1000 Appearance and Dimensions .....	49
10.3. GTD-5000 & PY-2000 Appearance and Dimensions .....	50
11. Precautions prior to Installation.....	51
11.1. Selection of installation site (according to Industrial Safety and Health Regulations) 51	
11.2. Selection of installation site (according to High Pressure Gas Safety Control Act) .....	51
11.3. Things to keep in mind when installing .....	52
11.4. Cable Wiring.....	52
12. Ordering Information .....	53
13. Revision History .....	55

## 1. Introduction

The GTD-5000 is a proven gas detector developed to prevent serious accidents which might be caused by unexpected gas leaks by detecting a variety of gases in hazardous areas such as industrial plants, gas storage facilities and factories in the process of producing or consuming flammable gases and toxic gases. When the GTD-5000, sampling-type gas detector, is installed in locations that may have gas leaks, it will continuously monitor the ambient level of gas and display the measured value of gas concentration on its integrated LCD. Additionally, it could generate DC 4-20mA standard output, RS-485 communication signal, Power over Ethernet(PoE) communication signal, and relay contact signal on occurrence of gas alarm. For standard output of DC 4-20mA, output receiver can support up to 2,500 meters distance away from gas detector to get output signal (only if CVVS or CVVSB 1.5sq ↑ shield cable is used). A communication signal of RS-485 can be transmitted up to 1,000 meters (only if RS0485 dedicated line is used). A communication signal of PoE(Power over Ethernet) can be transmitted up to 100 meters.

## 2. Structure

The case of GTD-5000 is made of steel.

This product can be installed in dangerous area that may have gas leakage, especially for flammable and/or toxic gases. The integrated 4-digit LCD indicates current gas leak status on the spot. The internal structure of the product mainly consists of five sub-parts as follows: (1) LCD that displays the measured value of gas, (2) main controller that measures and controls a gas concentration and flow rate, (3) output current (DC 4-20mA) or RS-485 communication signal, (4) PoE communication signal, and (5) terminal part that delivers alarm signal to outside of the product. A sensor is a removable cartridge type, so that it can be easily detached and replaced.

### 3. Specification

Items	Specifications
Measuring type	Auto Sampling type
Measuring value display	LCD display of measured value(4-digit), alarm and flow rate etc.
Enclosure	Non-explosion proof type
Detectible Gas	Toxic gas, Oxygen, Flammable gas
Measuring Method	Electro-chemical, catalytic combustion, and semiconductor type
Flow rate	Maximum 0 ~ 1,000 ml/min & minimum normal 300~500ml/min
Gas sample line	Within 40m ( 1/4" Tube )
Micro air pump	AC 6V, Max 1.8l/min, 350g(Diaphragm Pump)
Measuring Range	0 – 9,999 Adjustable(refer to Ordering Information)
Accuracy	≤ ±3% / Full Range
Zero Drift	≤2% / Full Range
Operation Temperature	-20 to 50 °C
Operation Humidity	5 to 99% RH (Non-condensing)
Inlet tube	1/4" Teflon Tube
Output signal	4 - 20mA DC / RS-485 Modbus / PoE(Power over Ethernet)
Relay contact point current	SPST, Load: AC 250V / 1A (Alarm1,Alarm2,Trouble)
Power supply	Standard :18 ~31V DC (24V DC normal) / 280mA Max.
	Pyrolyzer( <b>NOTE1</b> ) : 18 ~31V DC (24V DC normal) / 520mA Max.
	PoE( <b>NOTE2</b> ) : 48V DC ±10% / 200mA Max.
Wiring	Standard type : (CVVS or CVVSB 1.5sq ↑)+Shield
Cable Connection Length	4 - 20mA DC Signal : 2500m
	RS-485 Modbus Signal : 1000m
	PoE(Power over Ethernet) : 100m
Mounting type	Wall mount
Weight	Standard type : 1.75kg
	GTD5000 &PY-1000 : 4.05kg
	GTD5000 &PY-2000 : 4.75kg
Dimensions	Standard type : 70(W) ×144(H) × 160(D) mm
	Pyrolyzer type(PY-1000) : 70(W) ×242.5(H) × 160(D) mm
	Pyrolyzer type(PY-2000) : 70(W) ×267.5(H) ×200(D) mm
Approval	CE ( EN50270:1999 )

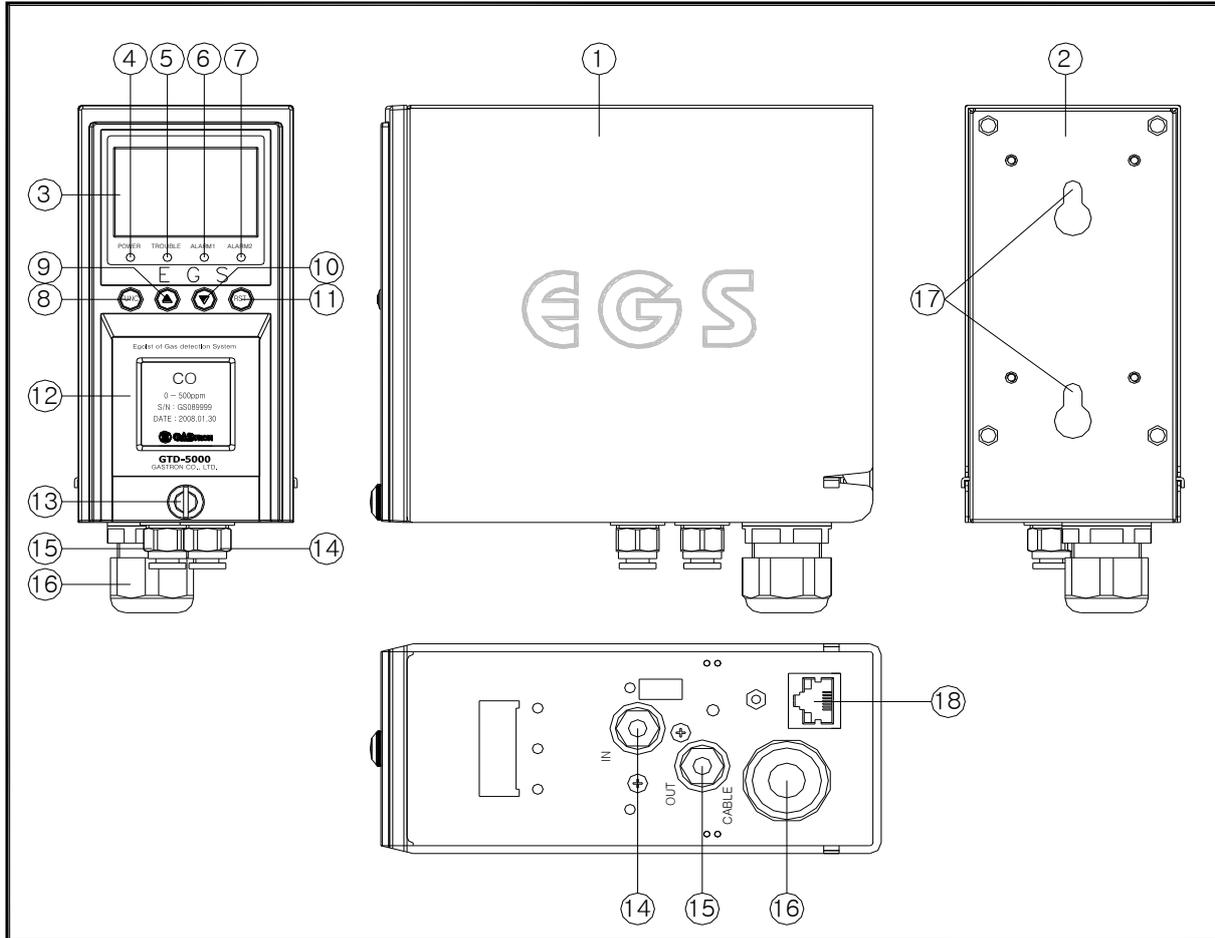
[Table1.Gas detector Specifications]

※NOTE1: Current consumed by Polyzer(PY1000, PY2000) Unit

※NOTE2: DC 24V should be supplied if you want to use Pyrolyzer in case of using PoE power (refer to 9.4.2)

## 4. Name and Functional Description of Components

### 4.1. Composing Elements

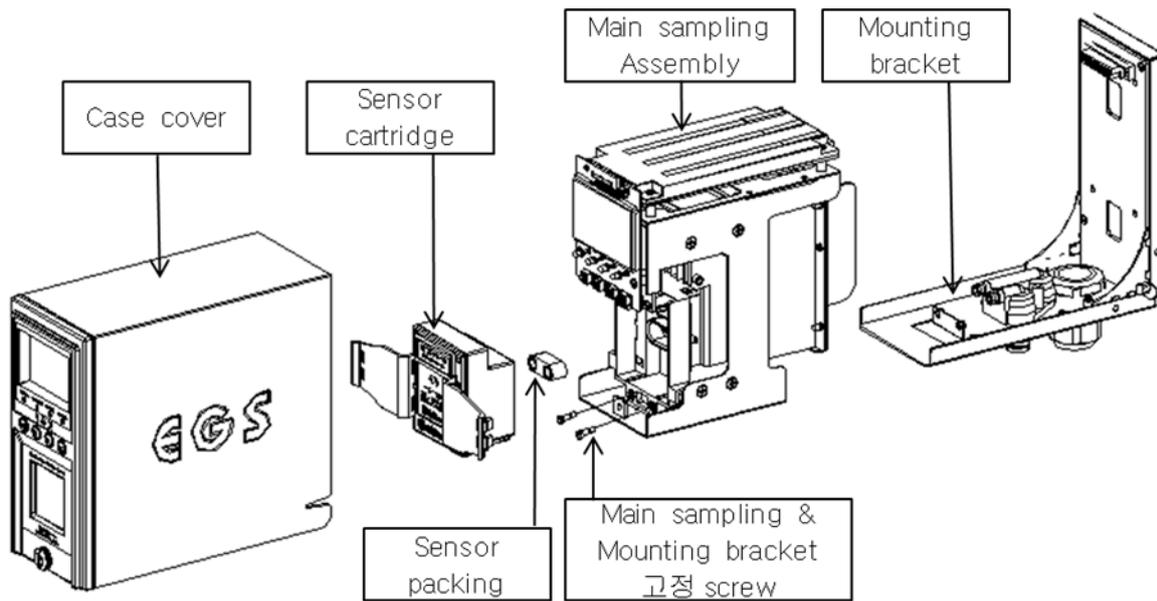


[ Figure 1. Components of the Gas Detector]

No.	Name	No.	Name
1	Case cover	10	Down key
2	Mounting bracket assembly	11	Reset key
3	LCD display	12	Sensor cartridge window
4	Power LED (Green)	13	Cover case fixed screw
5	Trouble LED (Yellow)	14	Sample gas inlet
6	Alarm1 LED (Red)	15	Sample gas outlet
7	Alarm2 LED (Red)	16	Gable gland
8	Function key	17	Mount Holes
9	Up key	18	PoE (Power over Ethernet) Connector

[Table2. Components reference table of the Gas detector]

## 4.2. Disassembly Diagram



[ Figure 2. Disassembly Diagram of the Gas detector]

## 4.3. Functional Description of Components

### 1) Case cover

It protects sensor and internal part such as PCB board and pump against environmental variations and shocks.

### 2) Mounting bracket assembly

It is a part used for fixing a case, including mounting hole, cable gland and in/output of gas etc.

### 3) LCD Display

It is used for displaying a value of gas concentration measured by sensor. It also indicates a setting mode with use of numbers and icons, when the user sets parameter. (For detailed description about icon, refer to 4.4 Front panel LCD layout)

### 4) Power LED (Green)

This Power LED is turned on when power is successfully supplied. (DC18~31V).

### 5) Trouble LED (Yellow)

This Trouble LED is turned on when a device is recognized as malfunctioned, for example, something wrong with sensor or flow rate. At the same time, trouble relay contact signal output is generated toward outside, to indicate troubled condition.

### 6) Alarm1 LED (Red)

This Alarm1 LED is turned on, when the measured value of gas concentration exceeds the preset value of Alarm1 level. In this case, relay contact signal output is produced toward outside as well.

(Alarm1 level can be set arbitrarily in alarm setting mode)

7) **Alarm2 LED (Red)**

This Alarm2 LED is turned on, when the measured value of gas concentration exceeds the preset value of Alarm2 level. In this case, relay contact signal output is also produced toward outside. (Alarm2 level can be set arbitrarily in alarm setting mode)

8) **Function key**

This key is used for changing and setting the mode. In measuring state, if you press and hold FUNC key for 2 seconds or more, the device enters a menu mode of function setting. (configuration, program, calibration, alarm and time etc.)

9) **Up key**

It is a key to increase a setting value in function setting mode.

10) **Down key**

It is a key to decrease a setting value in function setting mode. If you press and hold it for 2 seconds or more, the device will enter maintenance mode (EMS: Emergency Maintenance System). Upon entering maintenance mode,  icon will turn on and  icon will flash on and off. While in maintenance mode, if you press and hold "down key" for 2 seconds or more, the device comes out of maintenance mode.

11) **Reset key**

In function setting mode, Reset Key is used for recovering the device's state back to menu state or measuring state. In measuring state, if you press and hold the Reset Key for 2 seconds or more, the device enters lock mode. In this case,  icon is turned on indicating the device is locking. If you press and hold reset key for 2 seconds or more again, device lock is released.

12) **Sensor cartridge window**

This window allows you to see sensor cartridge. Looking at the sensor cartridge, you can check a name of applied gas and a valid measuring range of the gas. Sensor cartridge is actually responsible for detecting whether gas is leaked. The sensor cartridge converts the leaked gas level to readable data and transmits the data to main controller. All the data related to sensor are stored in sensor cartridge. If sensor cartridge is replaced, it will recognize data automatically and operate properly.

13) **Cover fixing screw**

It is a screw that firmly fixes main body case and front cover case.

14) **Sample gas inlet**

It is a sample gas inlet port. (1/4" Tube)

15) **Sample gas outlet**

It is a sample gas outlet port. (1/4" Tube)

16) **Cable gland**

It is an inlet for power cable and signal cable.

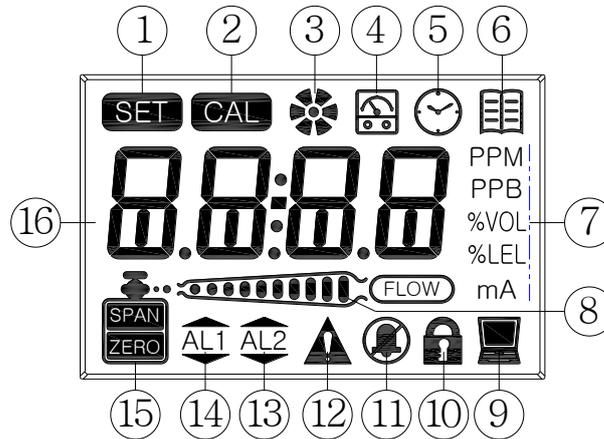
17) **Mount holes**

These holes are used for fixing the gas detector to wall or other flat surface.

18) **PoE(Power Over Ethernet) Connector**

It is a RJ45 ethernet connector supporting PoE communication.

**4.4. Front Viwe of LCD Layout**



[ Figure3. Front View of LCD Layout ]

No	Name	Descriptions
1	Setting Icon	Indicating that value setting operation is being processed.
2	Calibrating Icon	Indicating that calibration procedure is being processed.
3	Operation Icon	It turns on when pump is being operated.
4	Testing Icon	Indicating that gas detector operates in test mode.
5	Time setting Icon	It turns on when internal time is being set.
6	Status Indicating Icon	Indicating that gas detector operates in internal setting display mode.
7	Measure unit Icon	Indicating that current measuring unit presented on screen. (PPM, PPM, %VOL, %LEL, mA)
8	Flow Rate Icon	When this icon appears, measured value of flow is indicated as 10 different levels, while in normal measuring state.
9	Communication Icon	This icon is turned on, when communication such as RS485 and PoE MODBUS is being used.
10	Lock Icon	Indicating device is in lock mode. Configuration mode is not allowed.
11	Alarm setting Icon	It turns on when alarm output is not allowed.
12	Fault Icon	It turns on when fault is detected during self-examination
13	Alarm2 Icon	Indicating that alarm is set or detected.
14	Alarm1 Icon	Indicating that alarm is set or detected.
15	Zero, Span Icon	Indicating that zero or span mode is entered during calibration
16	String Indication	It is used for displaying measured value or message to the user

[ Table 3. LCD Display Layout Icon Description ]

## 5. Menu Table

Level1	Level2	Level3	Default
CONFIG- URATION MODE (Conf)	Add(Address)	OFF,1~64 (Communication address for 485 Modbus)	OFF
	PSWd(Password)	0~99 (setting password)	00
	C-tm(Calibration Time)	OFF, 1~12(Setting calibration period in month)	OFF
	SUPr(Suppression)	OFF, 1~50 (measured gas suppression rate, operates in 20% of full range)	03%
	PyrO(Pyrolyzer)	On ,OFF (set if power current consumed by Pyrolyzer is used)	OFF
	U-01(Version)	Firmware version number	-
	End	-	-
PROGR- AM MODE (Prgm)	UnIt	PPM, PPB, %VOL,, %LEL (Setting measuring unit)	%LEL
	dP-S(Decimal Point)	1000, 100.0, 10.00, 1.000 (Setting measurement accuracy)	100
	H-SL(High Scale)	1~9999 (Setting Full Range(High Scale) of measurement)	100
	End	-	-
CALIBRA- TION MODE (CALb)	ZERO	no , YES	no
	0 PPM	Zero current measured value	-
	Wait(Wait)	-	-
	GOOd(Good)	Good, Fail	-
	0 PPM	Measured value after completing zero calibration	-
	SPAN	no , YES	no
	50 PPM	Setting standard value of gas for SPAN calibration	50%/F.R.
	45 PPM	Current measured value	-
	Wait(Wait)	-	-
	GOOd(Good)	Good, Fail	-
	50 PPM	Measured value after completing Span Calibration	-
	End	-	-
ALARM MODE (ALAm)	LACH(Latching)	On , OFF	OFF
	AL-1(Alarm 1)	Setting 90% of 1~Full range.	20%/F.R.
	1H/1L(Alarm direction)	H: High level Alarm / L: Low level Alarm	1H
	1H00/1L00(Dead band)	0~10%/Full Range	1H00
	AL1t(Alarm1 time)	0~30sec(Alarm delay time)	1sec
	A1rL(Alarm1 Relay)	On , OFF(setting for relay use)	On
	A1br(Alarm1 blinking)	On , OFF(setting for relay blinking use)	OFF
	AL-2(Alarm 2)	Setting 90% of 1~Full range	40%/F.S.
	2H/2L(Alarm direction)	H: High level Alarm / L: Low level Alarm	2H
	2H00/2L00(Dead band)	0~10%/Full Range	2H00
	AL2t(Alarm2 time)	0~30sec(Alarm delay time)	1sec
	A2rL(Alarm2 Relay)	On , OFF(setting for relay use)	On
	A2br(Alarm2 blinking)	On , OFF(setting for relay blinking use)	OFF
	End	-	-

Level1	Level2	Level3	Default
TIME MODE (timE)	CLOC(Clock)	Current time reading mode	
	2012	Year	
	10-16	Month/Day	
	12:30	Hour/Minute	
	End	-	-
	CLtm(Calibration time)	Calibration date reading mode	
	2012	Year	
	10-16	Month/Day	
	12:30	Hour/Minute	
	End	-	-
	S-tm(Sensor time)	Sensor manufacturing date reading mode	
	2012	Year	
	10-16	Month/Day	
	12:30	Hour/Minute	
	End	-	
SENSOR DATA MODE (S-dt)	Type(Sensor Type)	ES(Explosive), tS(Toxic)	tS
	SdIr(Sensor direction)	PLUS, MIus	PLUS
	gAIn(Gain)	1,2,4 (Sensor output gain ratio)	g – 1
	SOUt(Sensor output)	Sensor output voltage(V)	0.000
	SPWr(Sensor power)	Sensor applied voltage(V)	0.000
	tSEt(Sensor time set)	No, YES(Sensor manufacturing date setting)	no
	End	-	
TEST MODE (tEst)	LCD	Check LCD display state	
	trly(Test Relay)	On , OFF (Set the alarm relay operation when testing)	OFF
	t-mA(Test mA output)	On , OFF (Set the mA output when testing)	OFF(4.0mA)
	tgAS(Test gas)	0~Full(Gas concentration and output signal test)	-
	FOUt(Flow-rate output)	500/2.20 (indicates measured flow(ml)/Pump voltage(V)) (Enables to adjust pump voltage by pressing Up(△ and Down(▽) Key)	-
		0.03/2.20 (indicates Pressure Sensor output voltage / Pump voltage) (Enables to adjust pump voltage by pressing Up(△) and Down(▽) Key) (unit: V)	-
	PyrO(Pyrolyzer power)	0.400A(Check the current consumed by Pyrolyzer)	0.000A
	tEmP(Temperature)	23 °C(Indicate current temperature of Gas detector)	Current temp.
	FrAm(F-RAM)	Good, Fail(FRAM test)	9ood
	End	-	
FLOW MODE (FLOW)	AutO(Auto)	YES(auto), no(manual) (setting type of flow control)	YES
	F-LE(Flow level)	OFF(0)~1000 ml/min (setting flow rate level)	500ml/min
	F-tm(Flow delay time)	15~60sec(Setting flow error latency time)	30sec
	End	-	

Level1	Level2	Level3	Default	
MAINTENANCE MODE (m-t)	PoE	On/OFF, Check operational state of PoE (Power over Ethernet)	On/OFF	
	CSEn (Cross sensitivity)	0.01~5.00 (setting relative sensitivity value)	1.00	
	mUAL (Measurement Value)	0~Full Range (set output value for EMS) Maintenance Mode (EMS: Emergency Maintenance System)	0 (O <sub>2</sub> : 20.9)	
	ZbAn (Zero band)	On, OFF (Zero band Suppression control setting)	On	
	AUZO (Auto zero)	On, OFF (Auto zero control setting)	On	
	Engm (Engineering Mode)	On, OFF (Setting on/off whether Engineering Mode is used or not)	OFF	
	Undr	On, OFF (Setting on/off whether Under function is used)	OFF	
	Odt (Output delay time)	OFF, 1~60sec (setting delay time of measured data)	OFF	
	Odu (Output delay value)	OFF, 1~20%/F.S (setting a range of output signal delay)	OFF	
	End	-		
NETWORK MODE (nEt)	IP (IP address)	192 (The first decimal number of IP address)	192	
		168 (The second decimal number of IP address)	168	
		1 (The third decimal number of IP address)	1	
		201 (The fourth decimal number of IP address)	201	
	SnET (Subnet Work mask)	255 (The first decimal number of subnet mask)	255	
		255 (The second decimal number of subnet mask)	255	
		255 (The third decimal number of subnet mask)	255	
		0 (The fourth decimal number of subnet mask)	0	
	Gw (Gateway address)	192 (The first decimal number of gateway)	192	
		168 (The second decimal number of gateway)	168	
		1 (The third decimal number of gateway)	1	
		254 (The fourth decimal number of gateway)	254	
	Mac	6C (Company ID1)	6c	
		E9 (Company ID2)	E9	
		83 (Company ID3)	83	
		00 (Unique Mac Address1 of gas detector)	00	
		00 (Unique Mac Address2 of gas detector)	00	
		00 (Unique Mac Address3 of gas detector)	00	
		End	-	

[ Table 4. Menu Table ]

## 6. How to Operate

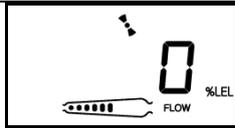
### 6.1. Check Power Wiring

- 1) Check a connection between terminal PCB CN1's operation power(+24V,GND) and 1-2 of J6 Jumper to make sure that the wiring is in good condition.
- 2) When PoE(Power over Ethernet) is used, CN4 (Ethernet port) should be plugged in. In this case, J6 Jumper must be connected via 2-3. (In case that pyrolzer option is chosen, PoE power will not be sufficient, so that separate power of +24V needs to be connected for supplying enough power)

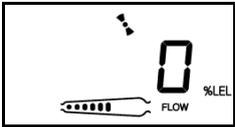
### 6.2. Power On

- 1) After making sure wiring and voltage of power, press Power switch in front panel to power up.
- 2) You can see device's operation as follows. First, power LED(Green) is turned on. Second, version information (U-01) is displayed. Third,"LOAD" message is displayed, which indicates sensor data is being loaded. Fourth, "WAIt"(Wait) and "Warm"(warming up) are displayed subsequently. Finally, device's state is transitioned to measuring state.
- 3) It will take about 30 seconds. While 'WAIt' is blinking, if you press RST(reset) key, message 'Warm' (warming up) will come up and the device enters measuring state.

	➤ If you turn on power switch, firmware version is shown for 2 seconds on LCD (gas concentration displaying area)
	➤ "LOAD" message will be displayed for 5 seconds while sensor cartridge is exchanging data with main controller at initial power-up stage. At this moment, keys are disabled.
	➤ Upon completion of data exchanging between sensor cartridge and main controller, "WAIt" will keep blinking for about 25 seconds during which the self-examination is being performed.
	<ul style="list-style-type: none"> <li>➤ If there is something faulty in this self-test, fault message will appear, and fault alarm will be generated.</li> <li>➤ "Warm" message will be displayed when sensor cartridge is warming-up.</li> </ul>
	➤ Upon completion of sensor cartridge warming-up, countdown starts from R5 to R1. After countdown finished, the device will go into measuring mode.
	➤ Countdown will show up whenever the device enters measuring mode from any other mode.



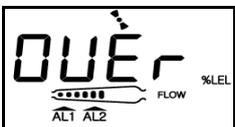
### 6.3. Gas Measuring State (Measuring Mode)



- Gas concentration value sent by sensor cartridge is displayed on LCD with numeric string. Current flow value is presented as bar graph.

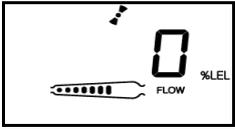
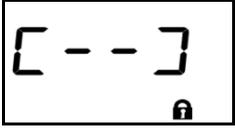
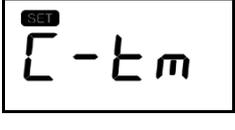


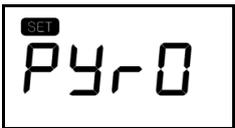
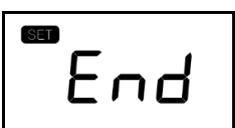
- If sensor cartridge gets faulty, an error code from "E-10" to "E-33" will be blinking. At the same time, trouble LED(Yellow) is turned on. (Regarding error code, please refer to 7. Error & Warning Message (Troubleshooting))



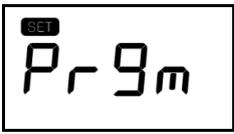
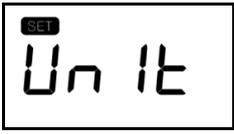
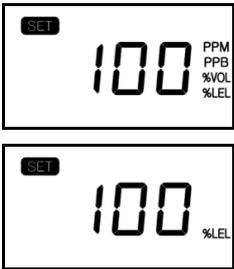
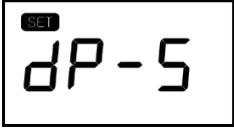
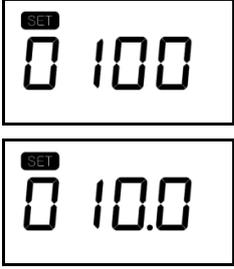
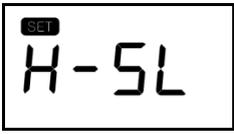
- If gas concentration value sent by sensor cartridge exceeds more than 10% of preset high scale value, message "OUER" will flash on and off every 0.5 second.
- If gas concentration value exceeds preset alarm value, and alarm delay time of corresponding alarm is elapsed, alarm goes off.
- While alarm delay is being counted, alarm LED lamp will blink on and off every 0.5 second. After alarm delay time is expired, alarm LED lamp remains ON.
- Alarm relay is turned on, after alarm delay time is expired.
- In case of alarm latch type is ON mode, alarm condition and gas concentration value remains(presented) in maximum level while alarm is being operated. Even when gas concentration value drops down under the alarm value, it doesn't change. If you want to recover it, press "Reset" key.
- In case of alarm latch type is OFF mode, alarm will operate automatically in accordance with gas concentration.

## 6.4. Environment Configuration(Configuration Mode)

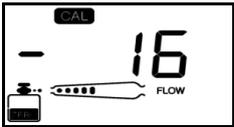
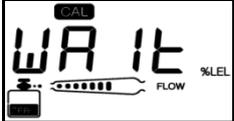
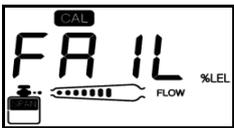
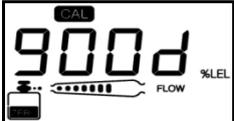
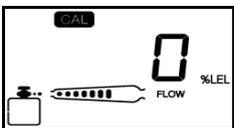
	<ul style="list-style-type: none"> <li>➤ In measuring mode, if you press and hold "FUNC" key for 2 seconds and more, password input screen appears( [ - - ] ) .</li> </ul>
	<ul style="list-style-type: none"> <li>➤  (lock) Icon is displayed and the device requires password. When the product is released from factory, an initial value is set to [00]. The value can be updated to any number ranging from 00-99 ([00]~[99]). If you enter password and then press FUNC key, you can change the mode by pressing UP(▲) key or DOWN(▼) key.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Once you choose "CONF"(configuration mode) by pressing UP key ("▲") or DOWN key("▼"), press "FUNC" key. Then you will enter configuration mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ For data communication such as RS-485, unique address should be assigned to the gas detector. It is a mode that user can set the address.</li> <li>➤ Press "FUNC" key, then you will enter address setting mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Address can be entered by pressing UP key("▲") or DOWN key("▼"). When the UP or DOWN key is pressed, the number will increase or decrease. The available range is from 01 to 64. Initially the value is supposed to be OFF.</li> <li>➤ When the desired address is being displayed, press "FUNC" key. Then the address will be set as desired. Subsequently, it will progress to next item.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It indicates the device stays in a password mode (PSWd).</li> <li>➤ In this mode, you can set password that allows the user to have authorization to change data for gas detector. When UP key("▲") or DOWN key("▼") is pressed, the number will increase or decrease. (Initial value :[00], valid range is [00]~[99])</li> </ul>
	<ul style="list-style-type: none"> <li>➤ You can set password to a value ranging from 00 to 99. Initial value is supposed to be [00].</li> <li>➤ When the desired value is being displayed, press "FUNC" key. Then password will be set to the desired value. Subsequently, it will progress to next item.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ This is a mode where you can set calibration interval in month. When UP ("▲") or DOWN key("▼") is pressed, the number will increase or decrease (Initial value :OFF, valid range is [01]~[12]).</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Calibration interval can be set from 01 to 12 month. Initial value is set to be OFF(no use). When the desired number is being displayed, press "FUNC" key. Then calibration interval will be set as desired. Subsequently, it will progress to next item.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It denotes suppression mode ("SUPr"). In this mode, you can set</li> </ul>

	<p>suppression percentage of gas concentration, which specifies gas concentration is displayed with zero. When UP key("▲") or DOWN key("▼") is pressed, the number of percentage will increase or decrease. (Initial value :[03], valid range is [01]~[50])</p>
	<ul style="list-style-type: none"> <li>➤ You can set the value within 1%~20% of full range. Initial value is set to 03(3%).</li> <li>➤ When desired value of percentage is being displayed, press "FUNC" key. Then suppression rate is set to be the desired percentage value. Subsequently, it will progress to next item.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can select whether you are going to use pyrolyzer or not. UP("▲") or DOWN key("▼") is used to set use or no-use.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ In case that Pyrolyzer is used, select ON. Otherwise, select OFF. Once choosing ON or OFF, press "FUNC"key. Then the desired setting is stored. Subsequently, it will progress to next item.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which program version is viewed.</li> <li>➤ If you press "FUNC" key, then you can see "END" message subsequently. When END is being displayed, press "FUNC" key. Then the device will go back to menu mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It indicates the completion of setting or updating in configuration mode. If you press "FUNC" key, it goes back to menu mode.</li> </ul>

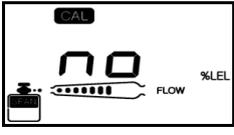
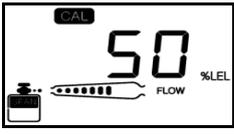
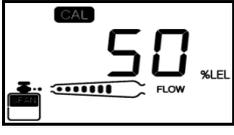
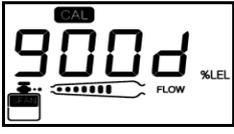
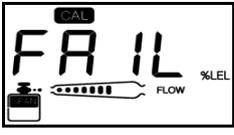
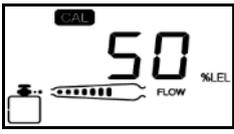
## 6.5. Program setting

	<ul style="list-style-type: none"> <li>➤ While gas concentration level is being indicated, press and hold "FUNC" key for 2 seconds or more. Then you can enter menu mode.</li> <li>➤ In menu mode, if you select "Pr gm"(program mode) using UP("▲") or DOWN key("▼") and then press "FUNC" key, you will enter program setting mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you set gas measuring unit. Whenever you press UP("▲") or DOWN key("▼"), unit icon at right-hand side will be changed.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It provides four types of measuring unit: PPM, PPB, %VOL and %LEL. Initially, the unit is set to be %LEL.</li> <li>➤ When desired unit icon is turned on, press "FUNC" key. Then measuring unit is successfully changed to the desired one. And then it will progress to next item.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ "dP-S" (Decimal point) implies that you can set decimal point position for gas concentration value.</li> <li>➤ Press "FUNC" key, and you will enter decimal point position setting.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Decimal point position can be adjusted in four ways (0.000, 00.00, 000.0, 0000) by touching UP("▲") or DOWN key("▼").</li> <li>➤ When desired position is being displayed, press "FUNC" key. Then decimal point position is set as desired. Subsequently, it will progress to next item.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ H-SL denotes that high scale setting function is being operated. High scale setting allows you to specify maximum value of measurement range.</li> <li>➤ Press "FUNC" key, and you will enter high scale setting function.</li> <li>➤ When the device is initially released, high scale value is determined within the range specified by domestic laws and regulations.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ High scale value can be modified in accordance with measurement range. Scale value will increase or decrease by pressing UP("▲") or DOWN("▼").</li> <li>➤ When desired value is being displayed, press "FUNC" key. Then high scale value is set as desired. Subsequently, it will progress to next item.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ This message indicates completion of setting and updating in program mode. If you press "FUNC" key, you will go back to menu mode.</li> </ul>

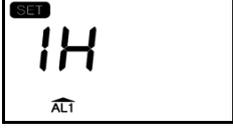
## 6.6. Zero Calibration

	<ul style="list-style-type: none"> <li>➤ While gas concentration level is being indicated, press and hold "FUNC" key for 2 seconds or more. Then you can enter menu mode.</li> <li>➤ In menu mode, if you select "CALb"(calibration mode) using UP("▲") or DOWN key("▼") and then press "FUNC" key, you can enter calibration mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ When "ZERO" Icon at left corner of bottom is blinking, press "FUNC" key. Then you will enter zero calibration mode.</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ Yes or no is displayed, which indicates whether zero calibration is selected or not.</li> <li>➤ If you select "YES" by touching UP("▲") or DOWN key("▼"), and then press "FUNC" key, you will see current value of gas concentration.</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ Insert clean air or 100% nitrogen for about one minute at the rate of 300mL/min into sensor by using calibration tool.</li> <li>➤ Once the measured value has been stabilized, press "FUNC" key. Then zero calibration will be performed automatically with indicating "WAIT" message.</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ If calibration is successfully completed, a message "GOOD" will be displayed for 2 seconds and then the mode will transit to calibrated concentration display mode.</li> <li>➤ If it fails, "FAIL" will appear and remain for 2 seconds, and then mode will transit to calibrated concentration display mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ In calibrated concentration display mode, if you press "FUNC" key, the mode will be changed to span calibration mode. If you press "RST", you will move to "CALb"(calibration mode).</li> </ul>

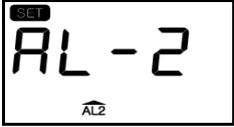
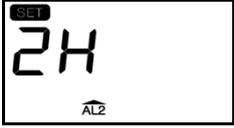
## 6.7. Span Calibration

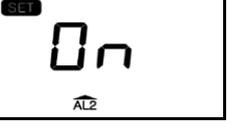
	<ul style="list-style-type: none"> <li>➤ While gas concentration level is being indicated, press and hold "FUNC" key for 2 seconds or more. Then you will enter menu selection mode.</li> <li>➤ In menu mode, if you select "CALb" using UP("▲") or DOWN key("▼") and then press "FUNC" key, you can enter calibration mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Select "SPAN" icon at left corner of bottom using UP("▲") or DOWN key("▼"). And then if you press "FUNC" key, you will enter span calibration mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Select Yes or No for selecting further progress of span calibration. Select "YES" using UP("▲") or DOWN key("▼"), and then press "FUNC" key, if you want to step forward.</li> </ul>
	
	<ul style="list-style-type: none"> <li>➤ In this mode, you can set standard value of gas. While concentration value is blinking, adjust value using UP("▲") or DOWN key("▼"). And then press "FUNC" key.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Insert standard gas for about 1 minute at the rate of 300mL/min into sensor with calibration tool. Once the measurement has been stabilized, press "FUNC" key. Then span calibration automatically will be performed and "WAIT" message will be displayed.</li> </ul>
	
	<ul style="list-style-type: none"> <li>➤ If calibration is successfully completed, a message "GOOD" will be displayed for two seconds and then the mode will be changed to calibrated concentration display mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ If it fails, "FAIL" will appear and remain for two seconds. Subsequently the mode will be changed to calibrated concentration display mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ In calibrated concentration display mode, if you press "FUNC" key, "END" message will be shown. At this moment, if you press "FUNC" again, the mode will be changed to "CALb" mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ This message indicates that calibration setting and updating is completed. If you press "FUNC" key, it will go back to menu mode.</li> </ul>

## 6.8. Alarm Data Setting (Alarm mode)

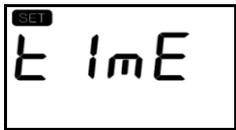
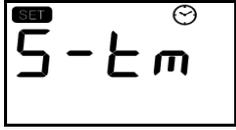
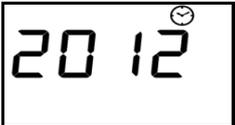
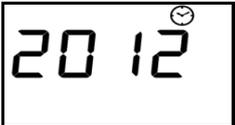
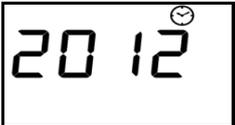
	<ul style="list-style-type: none"> <li>➤ While gas concentration level is being indicated, press and hold "FUNC" key for 2 seconds or more. Then you can enter menu selection mode.</li> <li>➤ In menu mode, if you select "ALAm"(Alarm mode) using UP("▲") or DOWN key("▼") and then press "FUNC" key, you can enter alarm setting mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set alarm latch type. Whenever you press UP("▲") or DOWN key("▼"), the value will be changed alternatively between "ON" and "OFF".</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Press "FUNC" key when desired alarm latch type is being displayed, then alarm latch type is set to be desired value. It will progress to next item.</li> <li>➤ There are two types of alarm latch: "ON" and "OFF". In case of OFF, alarm will be reset automatically. In case of ON, alarm will be turned off only when the user explicitly presses "RESET" key.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ A message "AL-1" means that it is alarm1 setting function.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set the value of alarm1 level. The value can be set within 90% range of 1~high scale.</li> <li>➤ Whenever UP("▲") or DOWN key("▼") is pressed, alarm1 value will increase or decreases.</li> <li>➤ Press "FUNC" key when desired value is being displayed. Then alarm1 value is set as desired. It will progress to next item.</li> <li>➤ When the device is initially released, alarm level is set to be concentration value specified by domestic laws and regulations.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set operating direction of alarm1. Whenever UP("▲") or DOWN key("▼") is pressed, "1H" or "1L" will be displayed alternatively.</li> <li>➤ "1H" indicates alarm will operate when measured value equals to or is higher than alarm1 setting value. On the other hand, "1L" indicates alarm will operate when it equals to or is less than alarm1 value.</li> <li>➤ Press "FUNC" key when desired mode is being displayed. Then the mode is set as desired. Subsequently, it will progress to next item.</li> <li>➤ Factory setting for alarm type is as follows: Flammable:1H &amp; 2H / Oxygen: 2H &amp; 1L / Toxic: 1H &amp; 2H type.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set dead band value with which alarm1 operates. Select value using UP("▲") or DOWN key("▼").</li> <li>➤ In case that alarm1 is in "1H" mode, alarm1 operates only when measured value equals to or is higher than alarm value + dead band. And alarm1 is turned off when it equals to or is less than alarm value – dead band.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ In case that alarm1 is in "1L", alarm1 operates only when measured value equals to or is less than alarm value – dead band. And alarm1 is turned off when it equals to or is higher than alarm value + dead band.</li> <li>➤ Press "FUNC" key when desired alarm1 dead band value is being displayed. Then alarm1 dead band value is set as desired, and the setting will progress to next item.</li> <li>➤ This function allows the user to set hysteresis value. Its purpose is to avoid the symptom in which alarm1 is turned on and off repeatedly when gas concentration value reaches around alarm1 setting value. When the product is released from manufacturing factory, this value is set to 0.</li> <li>➤ For example, alarm is turned on 22% LEL and off 18% LEL in case of 20%LEL for alarm setting and 2%LEL for dead band.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ A message "AL1t" denotes alarm1 delay time setting function.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Time can be set from 0 to 60 seconds. The purpose of the time delay is to avoid instant faulty operation affected by shock or noise from outside.</li> <li>➤ Alarm1 delay time can be set using UP("▲") or DOWN key("▼"). Whenever UP/DOWN key is pressed, the time increases or decreases by one second.</li> <li>➤ Press "FUNC" key when desired value is being displayed. Then alarm1 delay time is set as desired, and the setting will progress to next item.</li> <li>➤ For example, alarm is turned on only after five seconds are elapsed maintaining higher value than alarm setting value in case of 20%LEL for alarm setting and 5 seconds for delay time. The alarm is not turned on, when the alarming condition is not maintained during 5 seconds.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ A message "A1rL" denotes alarm1(relay) contact point output setting function.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set alarm1 contact point output. "ON" and "OFF" is shown alternatively whenever UP("▲") or DOWN key("▼") is pressed.</li> <li>➤ Press "FUNC" key when desired alarm1 contact point output method is being displayed. Then alarm1 contact point output mode is set as desired. The setting will progress to next item.</li> <li>➤ There are two modes, "ON" and "OFF" for alarm1 contact point output. In case of OFF, alarm1 contact point output will not be generated. In case of ON, it will be generated.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is an alarm1 blink relay function in which you can set ON/OFF repetitive operation for alarm1 with one second interval.</li> </ul>

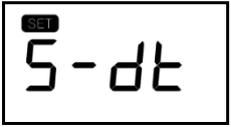
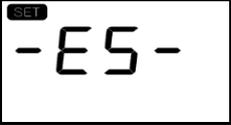
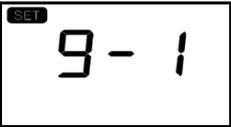
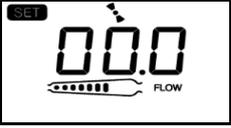
	<ul style="list-style-type: none"> <li>➤ By default, it is set to OFF. If it is switched to ON, alarm1 relay output will operate ON and OFF alternatively every one second.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ A message "AL-2" denotes alarm2 value setting function.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set alarm2 level value. The value can be set within 90% of 1~high scale.</li> <li>➤ Whenever UP("▲") or DOWN key("▼"key) is pressed, alarm2 value increases or decreases.</li> <li>➤ Press "FUNC" key when desired value is being displayed. Then alarm2 is set as desired. Subsequently, the setting will progress to next item.</li> <li>➤ Alarm level is set as specified by domestic laws and regulations, when the product is initially released.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set operating direction of alarm2. Whenever UP("▲") or DOWN key("▼") is pressed, "2H" or "2L" will be displayed alternatively.</li> <li>➤ "2H" indicates that alarm will operate when measured value equals to or is higher than alarm2 setting value. On the other hand, "2L" indicates alarm will operate when it equals to or is less than alarm2 value.</li> <li>➤ Press "FUNC" key when desired mode is being displayed. Then the mode is set as desired. The setting will progress to next item.</li> <li>➤ When the product is initially released from factory, alarm type is se as follows: Flammable: 1H &amp; 2H / Oxygen: 2H &amp; 1L / Toxic: 1H &amp; 2H Type</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set dead band value with which alarm2 operates. Select value using UP("▲") or DOWN key("▼").</li> <li>➤ In case that alarm2 is "2H" mode, alarm2 operates when measured value equals to or is higher than alarm2 value + dead band. And alarm2 is turned off when it equals to or is less than alarm2 value – dead band.</li> <li>➤ In case that alarm2 is "2L" mode, alarm2 operates only when measured value equals to or is less than alarm value – dead band. And alarm2 is turned off when it equals to or is higher than alarm value + dead band.</li> <li>➤ Press "FUNC" key when desired alarm2 dead band value is being displayed, then alarm1 dead band value is set as desired, and the setting will progress to next item.</li> <li>➤ This function allows the user to set hysteresis value in order to avoid the symptom in which alarm2 is turned on and off repeatedly when gas concentration value reaches around alarm2 setting value. When the product is released from manufacturing factory, this value is set to 0.</li> <li>➤ For example, alarm is turned on 22% LEL and off 18% LEL in case of 20%LEL for alarm setting and 2%LEL for dead band.</li> </ul>

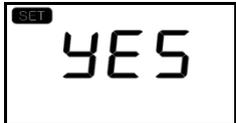
	<ul style="list-style-type: none"> <li>➤ A message "AL2t" denotes alarm2 delay time setting function.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Time can be set from 0 to 60 seconds. The purpose of the time delay is to avoid instant faulty operation affected by shock or noise from outside.</li> <li>➤ Alarm2 delay time can be set using UP("▲") or DOWN key("▼"). When the key is pressed, the time increases or decreases by one second.</li> <li>➤ Press "FUNC" key when desired value is being displayed, then alarm2 delay time is set as desired, and the setting will progress to next item.</li> <li>➤ For example, alarm is turned on only after five seconds are elapsed maintaining higher value than alarm setting value in case that you set 20%LEL for alarm setting and 5 seconds for delay time. The alarm is not turned on, when alarming condition is not maintained during 5 seconds.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ A message "A2rL" denotes alarm2 (relay) contact point output setting function.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set alarm1 contact point output. "ON" and "OFF" is shown alternatively whenever UP("▲") or DOWN key("▼") is pressed.</li> <li>➤ Press "FUNC" key when desired alarm2 contact point output method is being displayed. Then alarm2 contact point output mode is set as desired. The setting will progress to next item.</li> <li>➤ There are two modes, "ON" and "OFF" for alarm2 contact point output. In case of "OFF", alarm2 contact point output will not be generated. In case of "ON", it will be generated.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is an alarm2 blink relay function with which you can set ON or OFF repetitive operation with one second interval.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ By default, it is set to OFF. If it is switched to ON, alarm2 relay output will operate ON and OFF alternatively every one second.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ This message indicates that alarm mode setting and updating is completed. If you press "FUNC" key, it turns to menu mode.</li> </ul>

### 6.9. Current Time Reading and Setting

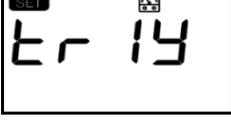
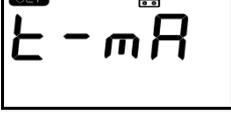
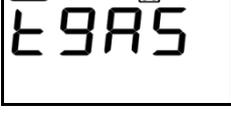
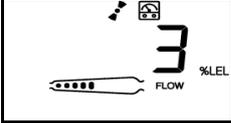
	<ul style="list-style-type: none"> <li>➤ While gas concentration level is being indicated, press and hold "FUNC" key for 2 seconds or more. Then you will enter menu selection mode.</li> <li>➤ In case that alarm1 is in "1H" mode, alarm1 operates only when measured value equals to or is higher than alarm value + dead band. And alarm1 is turned off when it equals to or is less than alarm value – dead band.</li> </ul>						
	<ul style="list-style-type: none"> <li>➤ If you select "CLOC" using UP("▲") or DOWN key("▼") and press "FUNC" key, mode will turn into current time reading and setting mode.</li> <li>➤ Current time is presented in following way: year/month,day/hour,minute. If you press and hold UP("▲") and DOWN("▼") key at the same time for a while, when hour and minute is being displayed, the mode will turn into time setting mode. In this mode, year/month,day/hour,minute will blink on and off. Time setting can be done in that sequence.</li> </ul>						
<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 33%;"></td> <td style="width: 33%;"></td> <td style="width: 33%;"></td> </tr> <tr> <td>(Year setting)</td> <td>(Date setting)</td> <td>(Time setting)</td> </tr> </table>					(Year setting)	(Date setting)	(Time setting)
							
(Year setting)	(Date setting)	(Time setting)					
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can read sensor manufacturing date (sensor time). Sensor manufacturing date can be registered in S-dt(Sensor data) mode.</li> </ul>						
<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 33%;"></td> <td style="width: 33%;"></td> <td style="width: 33%;"></td> </tr> <tr> <td>(Year setting)</td> <td>(Date setting)</td> <td>(Time setting)</td> </tr> </table>					(Year setting)	(Date setting)	(Time setting)
							
(Year setting)	(Date setting)	(Time setting)					
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can read lastest time when span calibration was done. This time information is automatically set when you do span calibration in "CALb" mode.</li> </ul>						
<table border="1" style="width: 100%; text-align: center;"> <tr> <td style="width: 33%;"></td> <td style="width: 33%;"></td> <td style="width: 33%;"></td> </tr> <tr> <td>(Year setting)</td> <td>(Date setting)</td> <td>(Time setting)</td> </tr> </table>					(Year setting)	(Date setting)	(Time setting)
							
(Year setting)	(Date setting)	(Time setting)					
	<ul style="list-style-type: none"> <li>➤ This message indicates that time mode setting and updating is completed. If you press "FUNC" key, it turns to menu mode.</li> </ul>						

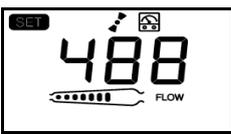
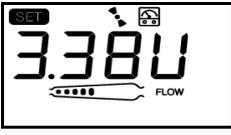
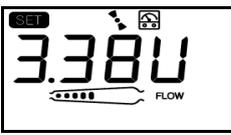
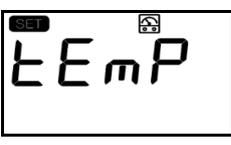
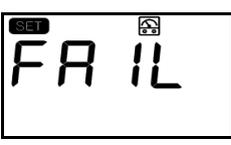
## 6.10. Checking and Setting Sensor Data

	<ul style="list-style-type: none"> <li>➤ While gas concentration level is being indicated, press and hold "FUNC" key for 2 seconds or more. Then you will enter menu selection mode.</li> <li>➤ In menu mode, if you select "S-dt"(sensor data mode) using UP("▲") or DOWN key("▼") and press "FUNC" key, the mode will turn into sensor data checking and setting mode.</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ It is a "tYPE" (Sensor type) mode, in which sensor type of sensor cartridge is indicated.</li> <li>➤ "ES" denotes flammable type sensor. "tS" denotes toxic type.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a "SdIr"(Sensor direction) mode, in which polarity of sensor output voltage is indicated.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ "PLUS" means that sensor generates output in a direction of (+) in correspondence with gas concentration. "mIUS"(minus) means that sensor generates output in a direction of (-). Plus or Minus can be selected using UP("▲") or DOWN key("▼").</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a "GAIn" (gain mode) in which you can set gain value for sensor output voltage of sensor cartridge.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ You can set gain to be one of three value as follows : "G-1","G-2" and "G-4". By default, it is set to be G-1, which means one time of gain. G-2 and G-4 denotes two times and four times gain respectively.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It denotes sensor output mode("SOUt"). In this mode, you can read sensor output voltage (mV) of sensor cartridge.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It means an output voltage of sensor.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It denotes sensor power mode ("SPWr"). In this mode, you can check bias voltage of sensor. (unit: V)</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It indicates an applied voltage to sensor (Bias voltage).</li> </ul>

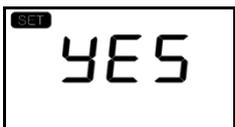
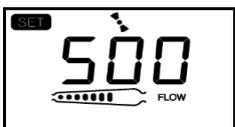
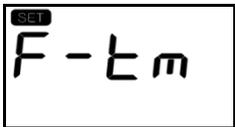
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set sensor manufacturing date and time.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ If you select "YES", current time will be set as manufacturing date for sensor. If you select "NO", no change will occur.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It indicates sensor data mode setting and updating is completed. If you press "FUNC" key, it turns to menu mode.</li> </ul>

## 6.11. Test Function Setting

	<ul style="list-style-type: none"> <li>➤ While gas concentration level is being indicated, press and hold "FUNC" key for 2 seconds or more. Then you will enter menu selection mode.</li> <li>➤ If you select "tEST"(test) using UP("▲") or DOWN key("▼") and press "FUNC" key, the mode will turn into test mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which all the icons on LCD are displayed and checked. If you press "FUNC" key, next test mode will start.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ All the icons on LCD will turn on. LEDs will blink. You can make sure that LED and LCD condition is all right.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It denotes "trLY"(Test relay)Mode. In this mode, you can check whether alarm relay is working properly when simulation test is performed for gas concentration.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ If you select "OFF", relay will not work. If you select "ON", relay will operate.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It denotes "t-mA"(Test mA output)Mode. In this mode, you can select On or Off for 4-20mA current when gas concentration simulation test is conducted.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ In case of "OFF", output current is fixed as 4mA during gas concentration simulation test. In case of "ON", output current will vary in accordance with actual gas concentration.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a test gas mode. It is a gas concentration simulation test mode with no regards to sensor. If you adjust a gas concentration value using UP("▲") or DOWN key("▼"), you can make alarm and output current operate in the same way as measuring mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ You can control gas concentration arbitrarily using UP("▲") or DOWN key("▼").</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a "FOUt" (Flow output) mode in which you can read measured flow, pump voltage(unit: V) and output voltage generated by flow sensor. Displaying unit is mV. The value will be displayed in digital number.</li> </ul>

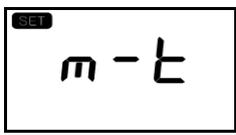
 	<p>➤ It indicates a measured flow. You can read pump voltage(unit:V) using UP("▲") or DOWN key("▼"). You can also change the pump voltage value using UP("▲") or DOWN key("▼").</p>
 	<p>➤ It indicates an output voltage(mV) generated by flow sensor. You can read pump voltage(unit:V) using UP("▲") or DOWN key("▼"). You can also change the pump voltage value using UP("▲") or DOWN key("▼").</p>
	<p>➤ It is a mode in which a current consumed by pyrolyzer power is presented.</p>
	<p>➤ In a "Conf" mode, if you select "OFF" which means pyrolyzer is not used, consumption power will be displayed as "OFF".</p>
	<p>➤ It is a "tEmp"(Temperture) mode in which a temperature of gas detector will be indicated.</p>
	<p>➤ It indicates an inside temperature of gas detector.</p>
	<p>➤ It is a "FrAM"(FRAM) test mode.</p>
 	<p>➤ According to test result, a message will appear. If it is successful, "Good"(900d) will come up. Otherwise, "FAIL" comes up.</p>
	<p>➤ It indicates test mode setting and updating is completed. If you press "FUNC" key, it turns to menu mode.</p>

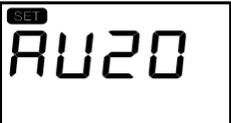
## 6.12. Flow Setting

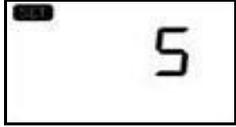
	<ul style="list-style-type: none"> <li>➤ While gas concentration level is being indicated, press and hold "FUNC" key for 2 seconds or more. Then you can enter menu mode.</li> <li>➤ If you select "FLOW"(flow) using UP("▲") or DOWN key("▼") and press "FUNC" key, the mode will turn into flow control mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ This is an automatic flow control mode. If you press "FUNC" key, you will see a screen to select "YES" or "NO".</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ Select "YES" or "NO" using UP("▲") or DOWN key("▼").</li> <li>➤ "YES" means that flow will be controlled automatically. "NO" means that flow will be set in manual way.</li> <li>➤ By default, it is set to "YES".</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a mode in which you can set flow level("F-LE").</li> </ul>
	<ul style="list-style-type: none"> <li>➤ By pressing UP("▲") or DOWN("▼") key, you can adjust flow level. In case of "OFF", pump is being turned off and flow rate can be set ranging from 100 to 1000mL/min. By default, it is set to be 500mL/min.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a flow time mode("F-tm") in which you can set error or warning message displaying time. E-21 indicates flow rate is less than 50ml/min. E-22 indicates flow rate is greater than 1200ml/min.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Time duration can be set using UP("▲") key or DOWN("▼") key. Valid range is 15~50 seconds. By default, it is set to be 30 seconds.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It indicates flow rate mode setting and updating is completed. If you press "FUNC" key, it turns to menu mode.</li> </ul>

### 6.13. Maintenance Mode Setting

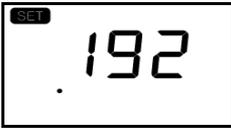
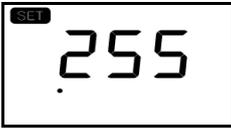
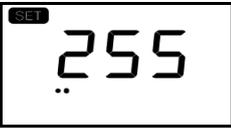
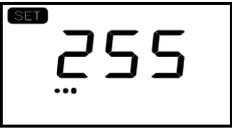
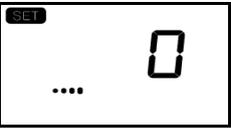
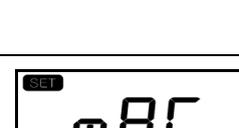
※  **The operations described in this section must not be allowed by general users.**

	<ul style="list-style-type: none"> <li>➤ While gas concentration level is being indicated, press and hold "FUNC" key for 2 seconds or more. Then you will enter menu mode,</li> <li>➤ If you select maintenance mode("m-t") using UP("▲") or DOWN key("▼") and press "FUNC" key, the mode will turn into maintenance mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It indicates whether PoE related component is included in your gas detector.</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ "OFF" means there is no PoE component. Therefore, PoE functionality is not supported.</li> <li>➤ "ON" means there exists PoE component. Therefore, PoE functionality is supported.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a cross sensitivity mode ("CSEn") in which relative sensitivity for sensor can be set.</li> <li>➤ For example, if you are using methane(CH<sub>4</sub>) for calibration and trying to measure isobutene, you need to refer relative sensitivity ratio of them.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Ranging from 0.01 to 5.00, sensitivity ratio can be adjusted using UP("▲") or DOWN key("▼"). By default, it is set to be 1.00.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a maintenance value level mode ("mUAL") in which you can set output value resulting from maintenance check (EMS: Emergency Maintenance System).</li> </ul>
	<ul style="list-style-type: none"> <li>➤ You can adjust the value ranging from 0 to full range, using UP("▲") or DOWN("▼") key.</li> <li>➤ By default, it is set to be 0. In case of Oxygen, it is 20.9.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a zero band auto numeric mode ("ZbAn"), which is a functionality to postprocess the actual measurement value with ranging of 2%~6.6%.</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ In case of "ON" for "ZbAn" function, postprocessing will be done as follows: (1) if actual measurement value equals to or is less than 2%, then 0%, (2) the actual measurement value equals to or is less than 3.3%, then actual measurement value – 2%, and (3) the actual measurement value equals to or is less than 6.6%, then actual measurement value – 1.6%.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ It is an auto zero mode ("AUZO") in which auto-zero calibration will be carried out.</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ In case of "ON", zero calibration is carried out as follows. If the value remains constant value (variation within <math>\pm 0.5\%</math>) ranging of 5%~-10%/full range during ten minutes or more, the constant value will be 0.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ This is an engineering mode ("Engm") in which you can set whether raw data is going to be output or not. It is a temporary function to be used while maintenance is performed.</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ In case of ON, current state(display the value below "0", display measured value without UNDER or OVER indicator) will be displayed and output without processing data.</li> <li>➤ By default, it is set to OFF. In case of OFF, the value below "0" will be presented "0".</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is a under mode ("Undr") in which you can set whether "Undr" is displayed or not when output value drops below 10% pivoting 0.</li> <li>➤ By default, it is set to OFF.</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ If you select ON, a message "Undr" will be displayed when gas detector's output drops below 10% pivoting 0.</li> <li>➤ If you select OFF, the value below "0" will be displayed as "0" without presenting "Under".</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is an output delay time mode ("Odt") in which you can set the delay time in second for output measured value on LCD. The device will present the measured value after this delay time duration is elapsed. Time can be set as OFF or 1-60seconds. (Default:OFF)</li> </ul>
 	<ul style="list-style-type: none"> <li>➤ The user can set the time delay ranging from 1 to 60 seconds. Output will appear after this time delay is elapsed.</li> <li>➤ OFF means no delay.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ It is an output delay value mode ("OdV") in which you can set measurement value's range you need to delay. (Default:OFF)</li> </ul>
	<ul style="list-style-type: none"> <li>➤ You can arbitrarily set it within 20% of full range. If the measured value resides in the range you set, the output display will be delayed until delay time is up.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ OFF means no delay. Therefore output will come up straight away.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It indicates maintenance mode setting and updating is completed. If you press "FUNC" key, it turns to menu mode.</li> </ul>

### 6.14. Network Setting

	<ul style="list-style-type: none"> <li>➤ While gas concentration level is being indicated, press and hold "FUNC" key for 2 seconds or more. Then you will enter menu mode.</li> <li>➤ If you select network mode("nEt") using UP("▲") or DOWN key("▼") and press "FUNC" key, the mode will turn into network setting mode.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ It is an IP addressing setting mode. If you press "FUNC"key, you enter IP address setting mode.</li> <li>➤ By default, it is set to 192.168.1.201.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ You need to set four bytes total. Adjust number using UP("▲") or DOWN("▼"). If you want to move a focus to next number, use "FUNC" key.</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">  </div> <div style="border: 1px solid black; padding: 2px;">  </div> <div style="border: 1px solid black; padding: 2px;">  </div> <div style="border: 1px solid black; padding: 2px;">  </div> </div> <p>(IP Address Byte1) (IP Address Byte2)(IP Address Byte3)(IP Address Byte4)</p>
	<ul style="list-style-type: none"> <li>➤ It is a subnetwork mask mode ("SnEt") in which you can set subnet mask. Setting mode can be entered by pressing "FUNC"key.</li> <li>➤ By default, it is set to 255.255.255.0.</li> </ul>
	<p>You need to set four bytes for subnet mask using UP("▲") and DOWN("▼") correspondingly. If you want to move a focus to next number, use "FUNC" key.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">  </div> <div style="border: 1px solid black; padding: 2px;">  </div> <div style="border: 1px solid black; padding: 2px;">  </div> <div style="border: 1px solid black; padding: 2px;">  </div> </div> <p>(Sub net Byte1)(Sub net Byte2)(Sub net Byte3)(Sub net Byte4)</p>
	<ul style="list-style-type: none"> <li>➤ It is a gateway mode ("GW") in which you can set gateway.</li> <li>➤ By default, it is set to 192.168.1.254.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ You need to set four bytes for gateway address using UP("▲") and DOWN("▼") correspondingly. If you want to move a focus to next number, use "FUNC" key.</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">  </div> <div style="border: 1px solid black; padding: 2px;">  </div> <div style="border: 1px solid black; padding: 2px;">  </div> <div style="border: 1px solid black; padding: 2px;">  </div> </div> <p>(G/W addr byte1)(G/W addr byte2)(G/W addr byte3)(G/W addr byte4)</p>
	<ul style="list-style-type: none"> <li>➤ It is a mac mode in which you set unique MAC address for gas detector.</li> <li>➤ By default, it is set to 6c, e9, 83, 00, 00, 00 in hexadecimal.</li> <li>➤ The first three bytes, 6c,e9 and 83, are our unique company ID that has been purchased from IEEE. The last three bytes has been assigned to each device differently and uniquely.</li> </ul>

	<p>➤ You need to set four bytes for MAC address using UP("▲") and DOWN("▼") correspondingly. If you want to move a focus to next number, use "FUNC" key.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <small>SET</small>              . 6C         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <small>SET</small>              .. E9         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <small>SET</small>              ... 83         </div> </div> <p style="display: flex; justify-content: space-around; font-size: small;"> <span>(MAC byte1)</span> <span>(MAC byte2)</span> <span>(MAC byte3)</span> </p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <small>SET</small>              ..... 00         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <small>SET</small>              ..... 00         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <small>SET</small>              .... 00         </div> </div> <p style="display: flex; justify-content: space-around; font-size: small;"> <span>(MAC byte4)</span> <span>(MAC byte5)</span> <span>(MAC byte6)</span> </p> <p><b>※ Please do not change default value without special reason, because the MAC address is unique ID for gas detector.</b></p>
<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 5px;"> <small>SET</small>              UP-n         </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <small>SET</small>              UP-y         </div>	<p>➤ If there is any change in the mode, a message "UP-n"(Update No) will show up to make sure. If you want to apply the updated change, select "UP-y"(Update Yes) using UP or DOWN key while the "UP-n" is being displayed. If you press "FUNC" key in "UP-y" message, the change will be applied and the gas detector will be rebooted automatically.</p> <p>➤ When you press "Reset" key in the middle of procedure, "UP-n" (Update No) message will appear if you has made any change. In this case, if you want to apply the change, select "UP-y" and press "FUNC" key.</p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <small>SET</small>              End         </div>	<p>➤ It indicates network mode setting and updating is completed. If you press "FUNC" key, it turns to menu mode.</p>

## 7. Error & Warning Message (Troubleshooting)

### 7.1. Error Code

Message	Description & Condition	Level
E-10	Sensor cartridge is not loaded to main body or is not qualified.	Out of order
E-11	Communication between sensor cartridge and main body is broken	Out of order
E-12	No sensor is included in sensor cartridge.	Out of order
E-13	24C02(EEPROM) in sensor PCB is malfunctioned.	Out of order
E-19	Zero of sensor is too low (Under)	Out of order
E-20	Flow sensor is not working properly (When sensor hose is replaced)	Out of order
E-21	Flow of the flow sensor is too low	Out of order
E-22	Flow of the flow sensor is too high	Out of order
E-30	The current of pyrolyzer is measured as below 50mA	Out of order
E-31	Internal EEPROM is not recognized	Out of order
E-32	The current of pyrolyzer is measured as over 550mA	Out of order

[ Table 5. Error Code ]

### 7.2. Warning Code

Message	Description & Condition	Level
W-00	Time is not set.	Warning
W-01	Calibration valid period has been expired.	Warning
W-02	Manufacturing date of sensor is not set.	Warning

[ Table 6. Warning Code ]

## 8. Communication Interface

### 8.1. 4~20mA Output Current

Output Current	Description
Below 3mA	Fault mode or Under Range(below -10%)
3mA	Maintenance Mode
4~20mA	Normal Operation ( 0~100% )
21.6mA	OVER Range(over 110%)

[ Table 7. Analog output current 4~20mA ]

### 8.2. 485 MODBUS Interface

#### 8.2.1. RS485 Communication Configuration

- 1) Baud rate: 9600 bps
- 2) Data bits: 8bits
- 3) Stop bit: 1bits
- 4) Parity: Even

#### 8.2.2. Address Architecture

Category	Address	Bits	Description
Gas concentration	30001	BIT15~0	Gas measurement value(Integer-type / Decimal Point is not considered)
High Scale value setting	30002	BIT15~0	High Scale value (Integer-type / Decimal Point is not considered)
Primary Alarm setting	30003	BIT15~0	Primary alarm value (Integer-type / Decimal Point is not considered)
Secondary Alarm setting	30004	BIT15~02	Secondary alarm value (Integer-type / Decimal Point is not considered)
Gas detector State value	10000	BIT0	Alarm 1 Active State
		BIT1	Alarm 2 Active State
		BIT2	Fault Active State
		BIT3	Maintenance Mode State
		BIT4	Test Mode State
		BIT5	Calibration Mode State
		BIT6	Reserved
External Test	3	BIT0~7	Gas detectorTest mode setting
External Reset	2	BIT0~7	Gas detectorTest mode termination

[ Table 8. RS485 Address Architecture ]

### 8.3. MODBUS/TCP Interface

Category	Address	Bits	Description
Gas detector State value 1	40001	BIT0~3	Monitoring state
			0: Warm up
			1: Measurement Mode
			2: Measurement Mode where alarm output is not allowed.
			3: Reserved
			4: Reserved
			5: Reserved
			6: Reserved
			7: 4~20mA Calibration mode
			8: Flow Calibration mode
		9~15: Reserved	
		BIT4	Fault Active state
		BIT5	Reserve
		BIT6	Alarm 1 Active state
BIT7	Alarm 2 Active state		
BIT8	Alarm1 Relay energized		
BIT9	Alarm2 Relay energized		
BIT10	Fault Relay energized		
BIT11	Toggle Bit in every 2 seconds		
BIT12~15	Reserved		
Reserve	40002	BIT0~15	Reserved
Real number type gas measurement value	40003	BIT0~15	Gas Concentration in floating point format word 1 of 2
	40004	BIT0~15	Gas Concentration in floating point format word 2 of 2
Integer type gas measurement value	40005	BIT0~15	Gas Concentration in integer Format
ErrorCode	40006	BIT0~15	Error Code
Decimal point and units	40007	BIT0~2	Decimal point indicator(0~3)
			0: 0 Point
			1: 1 Point
			2: 2 Point
			3: 3 Point
			4~7: Reserved
		BIT3~7	Reserved
		BIT8~11	Concentration units
			0: Reserved
			1: PPM
			2: PPB
			3: Reserved
			4: % Volume
			5~7: Reserved
8: % LEL			
BIT12~15	Reserved		

Category	Address	Bits	Description
Temperature measured by gas detector	40008	BIT0~15	Temperature(Signed 16bit Integer)
Reserved	40009	BIT0~15	Reserved
Reserved	40010	BIT0~15	Reserved
Flow measurement value	40011	BIT0~15	Measured flow value
Reserved	40012	BIT0~15	Reserved
Real number type primary alarm setting	40013	BIT0~15	Alarm1 Value in floating point format word 1 of 2
	40014	BIT0~15	Alarm1 Value in floating point format word 2 of 2
Real number type secondary alarm setting	40015	BIT0~15	Alarm2 Value in floating point format word 1 of 2
	40016	BIT0~15	Alarm2 Value in floating point format word 2 of 2
Reserved	40017	BIT0~15	Reserved
Reserved	40018	BIT0~15	Reserved
Gas detector state value 2	40019	BIT0	Alarm1
		BIT1	Alarm2
		BIT2	Fault Bit
		BIT3	MAINTANCE
		BIT4	TEST
		BIT5	CAL
		BIT6	Reserved
		BIT7	Reserved
Real number type high Scale setting value	40020	BIT0~15	High Scale Value in floating point format word 1 of 2
	40021	BIT0~15	High Scale Value in floating point format word 2 of 2
Integer type high Scale setting value	30001	BIT0~15	Gas measurement value(Integer type / Decimal Point is not considered)
Integer type High Scale	30002	BIT0~15	High Scale setting value(Integer type / Decimal Point is not considered)
Integer type primary alarm setting value	30003	BIT0~15	Primary Alarm setting value(integer type/decimal point is not considered)
Integer type secondary alarm setting value	30004	BIT0~15	Secondary Alarm setting value(integer type/decimal point is not considered)
Category	Address	Bits	Description
Gas detector state value 2	10001	BIT0	Alarm1
		BIT1	Alarm2
		BIT2	Fault Bit
		BIT3	MAINTANCE
		BIT4	TEST
		BIT5	CAL
		BIT6	Reserved
		BIT7	Toggle Bit (in every 2 seconds)

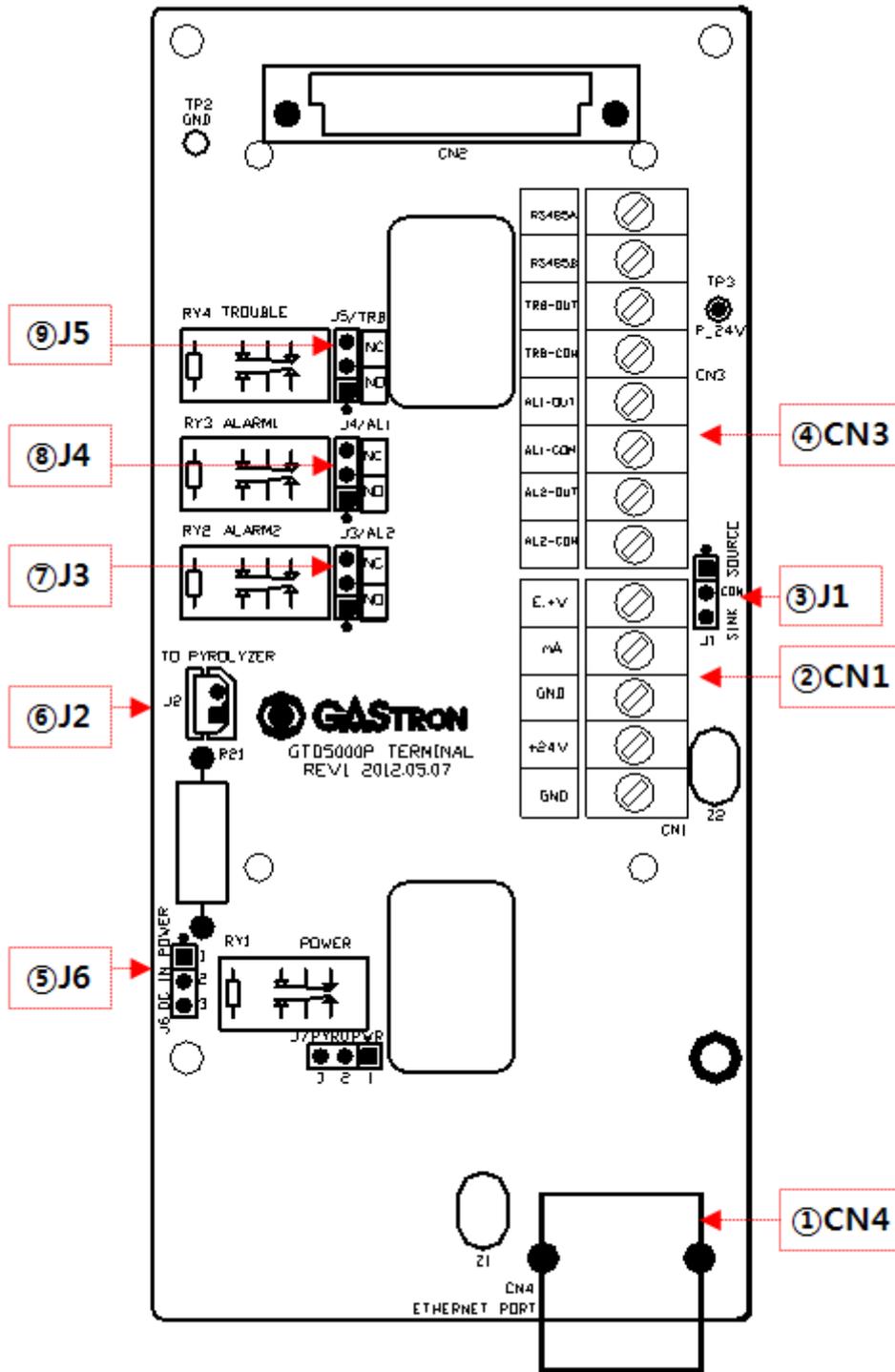
[ Table 9. MODBUS/TCP Address Architecture ]

- **Alarm write Address**

Integer type Primary Alarm write	40001	BIT0~15	Primary Alarm write(Integer / Decimal Point is not considered))
Integer type Secondary Alarm write	40002	BIT0~15	Secondary Alarm write (Integer / Decimal Point is not considered))

[ Table 10. MODBUS/TCP Address Architecture ]

### 8.4. Terminal Board Connector Layout



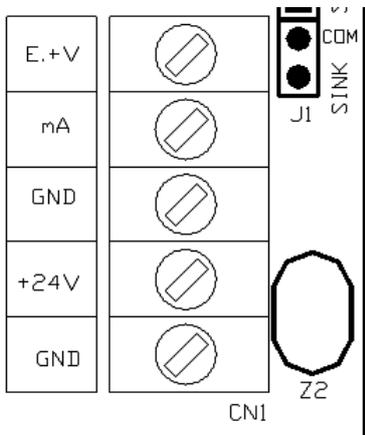
[ Figure 4. Terminal Board Connector Layout ]

Item	Description	Item	Description
①CN4	RJ45 Ethernet Connector(PoE)	⑥J2	Pyrolyzer Power supply Connector
②CN1	Power & Output Signal Terminal	⑦J3	Alarm2 Relay NO, NC Selection Jumper
③J1	4~20mA Sink or Source selection Jumper	⑧J4	Alarm1 Relay NO, NC selection Jumper
④CN3	RS485 & Relay Contact Terminal	⑨J5	Fault NO, NC selection Jumper
⑤J6	Power selection Jumper		

[ Table 11. Terminal Board Connector Description ]

## 8.5. Terminal Board Connector Detailed Description

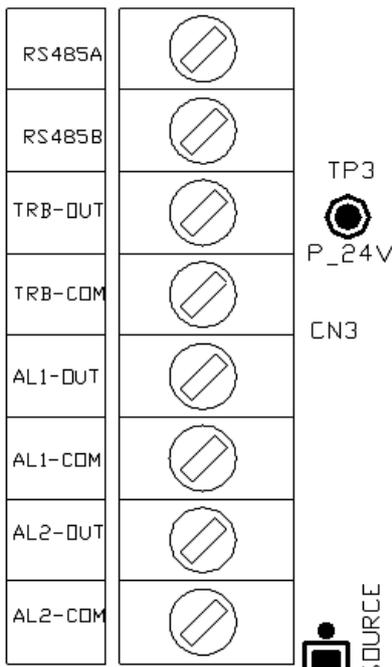
### 8.5.1. Power & Output Signal Terminal(CN1)



Item	Description
E.+V	External power input connector in case of J1 SINK selected
mA	4~20mA output connector
GND	mA and Gas detector power GND
+24V	Gas detector Power DC +24V
GND	Gas detector Power GND

[Table 12. Detailed Description on CN1]

### 8.5.2. RS485 & Relay Contact Terminal(CN3)



Item	Description
RS485A	RS485 Communication connector A
RS485B	RS485 Communication connector B
TRB-OUT	Trouble relay output connector
TRB-COM	Trouble relayCommon connector
AL1-OUT	Alarm1 relay output connector
AL1-COM	Alarm1 relayCommon connector
AL2-OUT	Alarm2 relay output connector
AL2-COM	Alarm2 relayCommon connector

[ Table 13. Detailed Description on CN3 ]

## 9. Connector Wiring Diagram

Untie screw fixing case cover in front of detector, and remove the case cover. Now untie two screws; one is fixing main sampling, and the other is fixing pump assembly. And then pull it toward yourself and remove the cover. You can find terminal PCB inside.

### 9.1. Power and 4-20mA Signal Connection

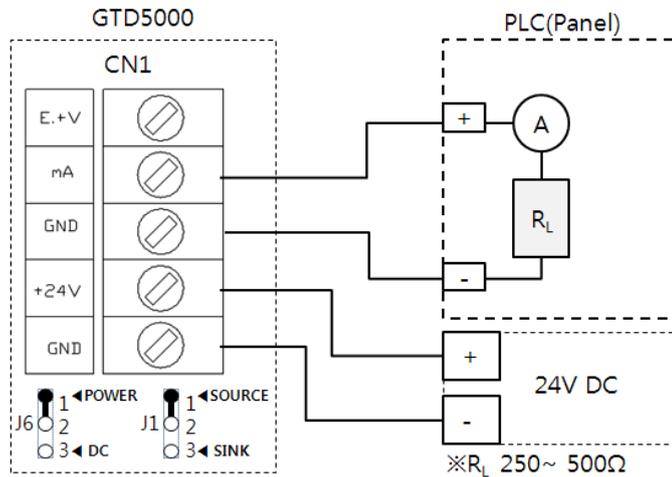
- 1) In case that DC24V is used as power, connect power to CN1(+24V,GND) connector, and connect J6 jumper to number 1 and 2.

**Note 1) Shield cable with length of 1.5sq or more should be used.**

**Note 2) If GTD 5000 analog output option is not given, the function will not be supported.**

#### 9.1.1. Power and 4~20mA Source Connection

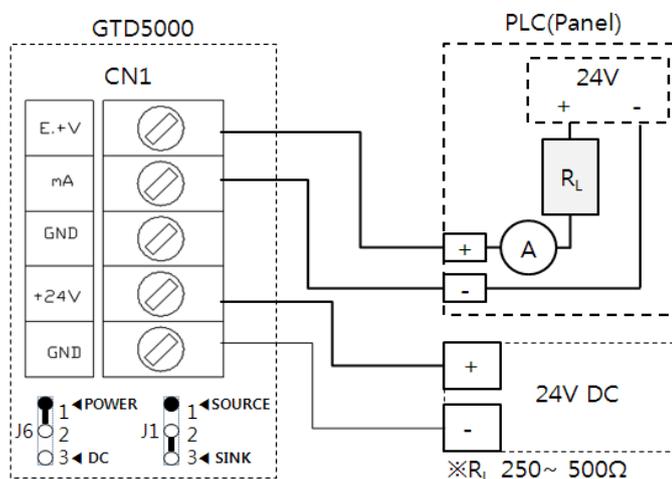
Connect 4-20mA signal connector at PLC side to 'mA' of GTD5000. In this case, GND connector is used as power. Set J1 jumper toward SOURCE direction.



[ Figure 5.4~20mA Source Driver Connection ]

#### 9.1.2. Power and 4~20mA Sink Connection

Connect 4-20mA Sink output(+) connector at PLC to E.+V connector, and connect (-) connector to 'mA'. Set J1 jumper toward SINK side.



[ Figure 6. 4~20mA Sink Driver Connection ]

## 9.2. Alarm signal connection

Trouble, alarm, relay connected to CN3 should be connected described as follows.

**Note 1) Relay is a type of SPDT, and a dry contact with 250V / 1A capacity.**

### 1) Trouble Relay Output Connection

Connector Name	Fault Relay Contact	Jumper Setting
TRB-OUT	Trouble Relay normally Closed	J5 Jumper NC on
	Trouble Relay normally Open	J5 Jumper NO on
TRB-COM	Trouble Relay Common	-

### 2) Alarm1 Relay Output Connection

Connector Name	Fault Relay Contact	Jumper Setting
AL1-OUT	Alarm1 Relay normally Closed	J4 Jumper NC on
	Alarm1 Relay normally Open	J4 Jumper NO on
AL1-COM	Trouble Relay Common	-

### 3) Alarm2 Relay Output Connection

Connector Name	Fault Relay Contact	Jumper Setting
AL2-OUT	Alarm2 Relay normally Closed	J3 Jumper NC on
	Alarm2 Relay normally Open	J3 Jumper NO on
AL2-COM	Trouble Relay Common	-

## 9.3. RS-485 Communication Signal Connection

Connect RS-485A and RS-485B of CN2 to master connectors as follows.

Connector Name	Master Connector Name	Note
RS485A	'TRXD+' or 'A' or 'P'	
RS485B	'TRXD-' or 'B' or 'N'	

**Note 1) RS-485 dedicated cable should be used.**

**Note 2) If RS485 option is not given in your GTD5000 device, the function will not be supported.**

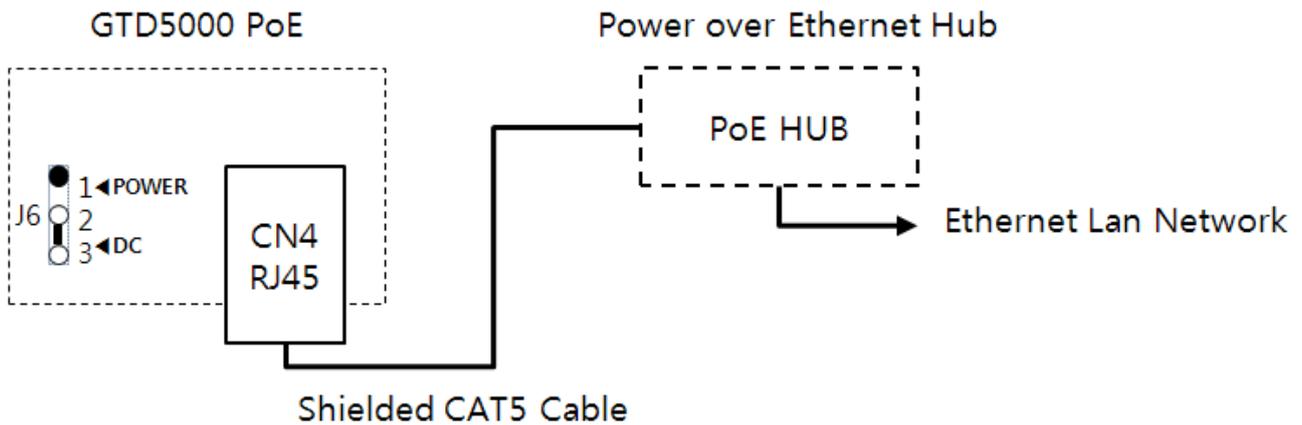
## 9.4. Ethernet Signal Connection

In case of using PoE Ethernet, the device conforming to IEEE802.3af standard must be used. Shielded CAT5 cable must be applied when connecting.

**Note 1) If PoE option is not given in your GTD5000, this function will not be supported.**

### 9.4.1. Connection in case of using PoE

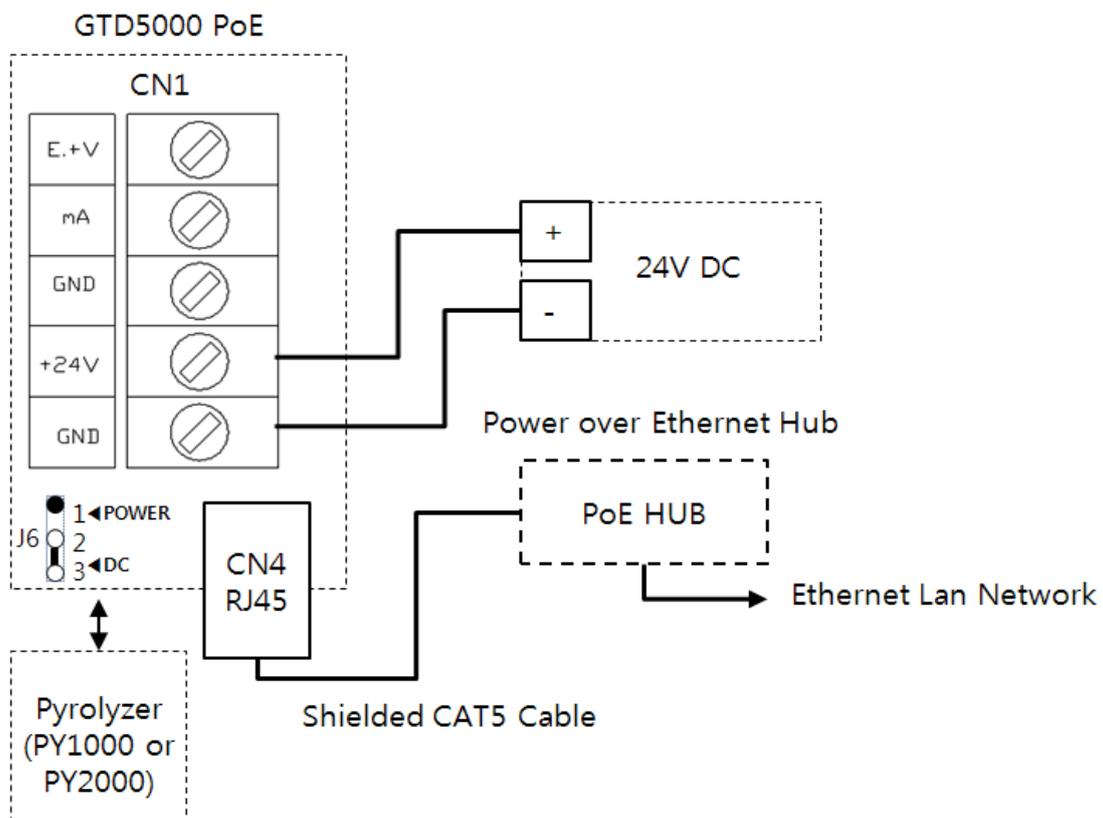
When using PoE power, set J6 jumper toward DC side.



[ Figure 7. PoE Configuration ]

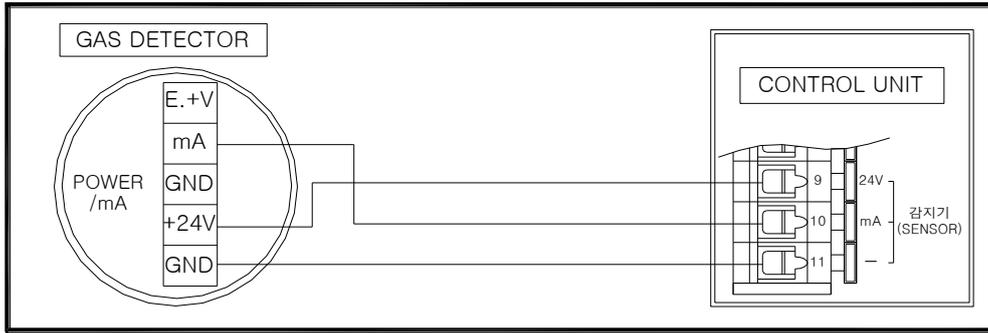
### 9.4.2. PoE Connection in case of using Pyrolyzer option

In case of using Pyrolyzer, separate DC power should be supplied to the GTD5000. Set J6 jumper toward DC side.

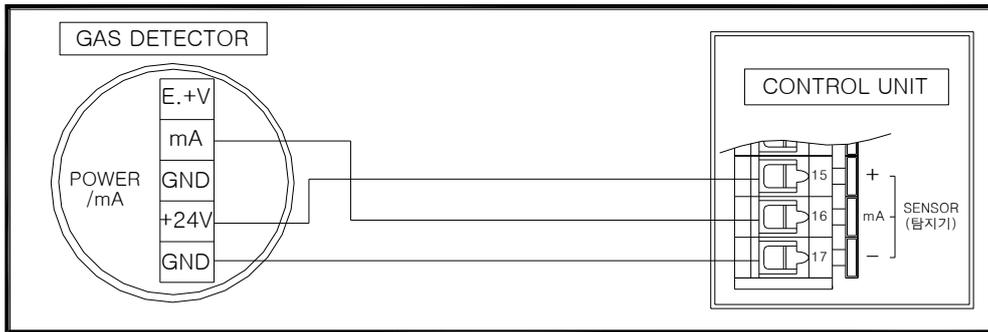


[ Figure 8. PoE Configuration in case of using Pyrolyzer ]

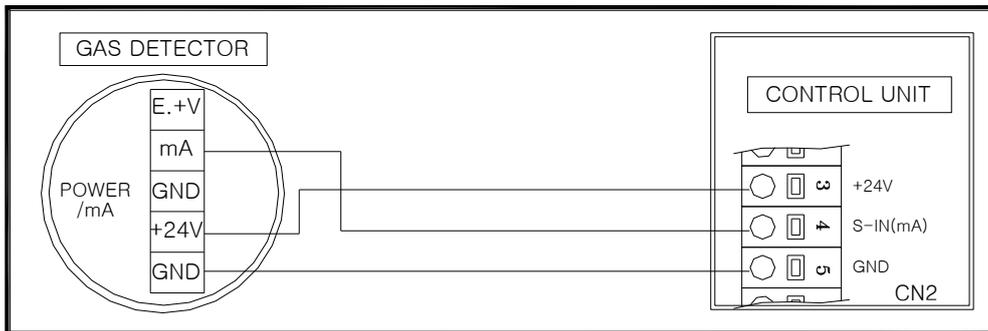
### 9.5. How to Connect the Gas Detector to Control Units



GTC-100A Series



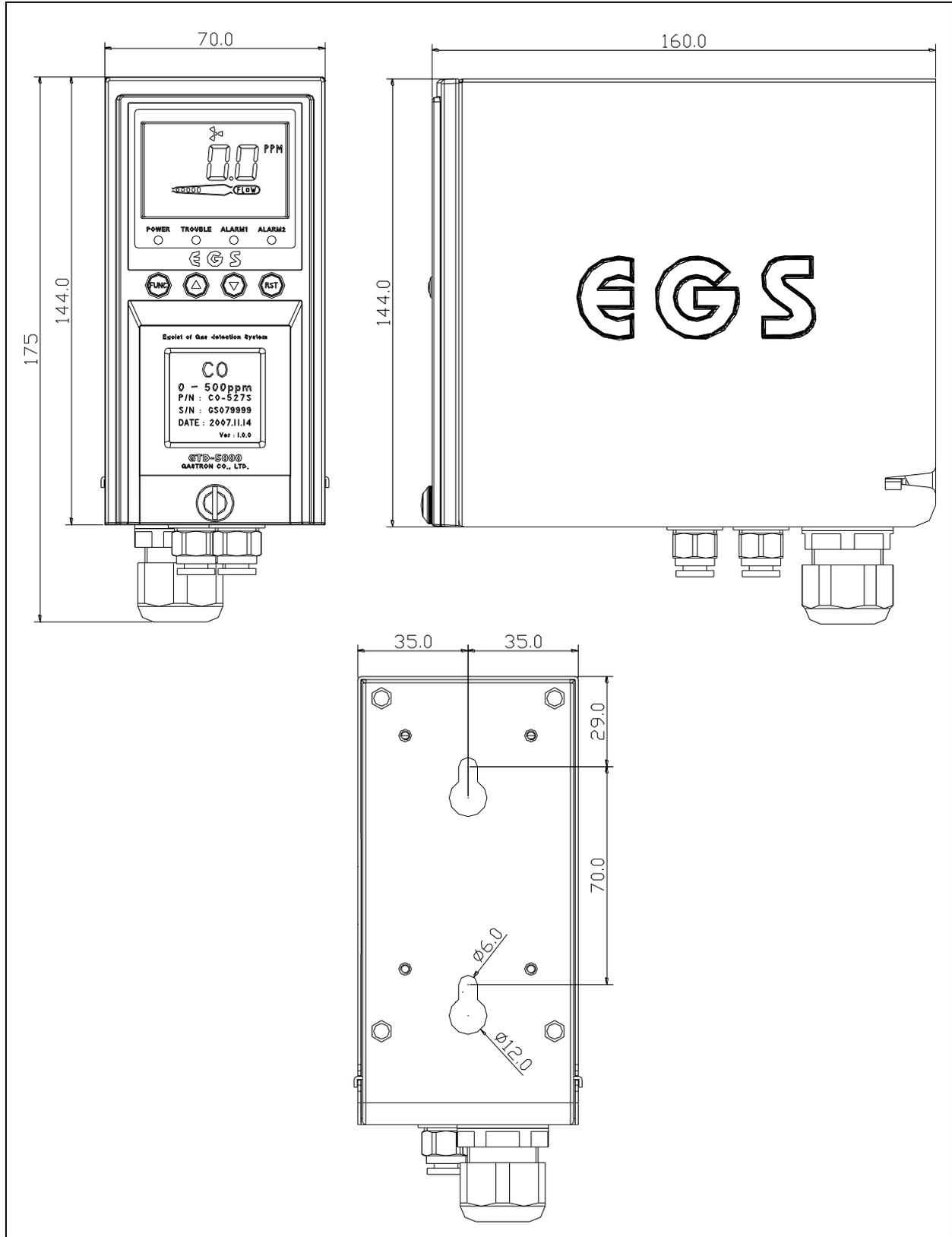
GTC-200A/210A Series



GTC-510A/520A Series

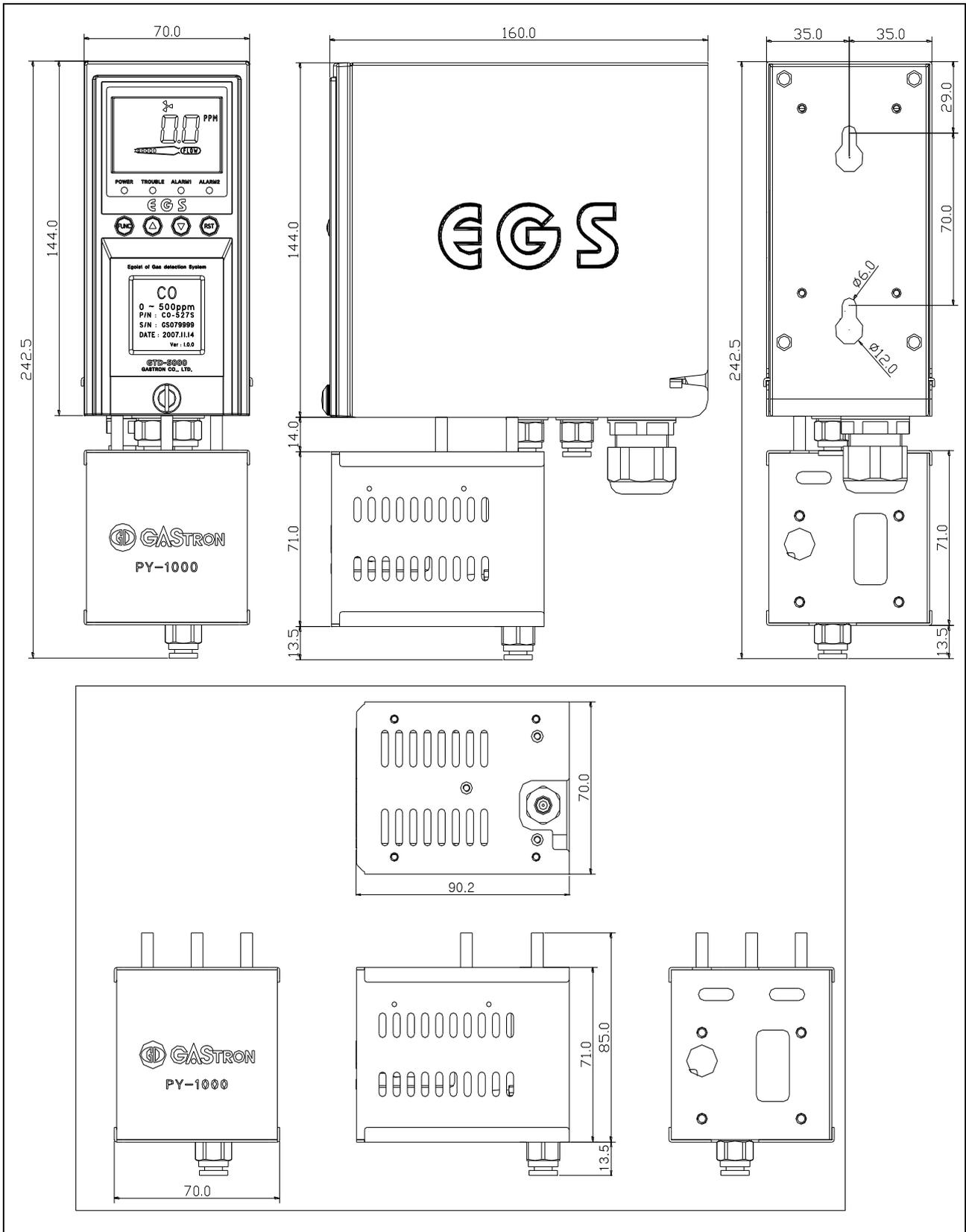
## 10. Appearance and Dimensions

### 10.1. GTD-5000 Appearance and Dimensions



[ Figure 9. GTD-5000 Appearance and Dimensions ]

## 10.2. GTD-5000 & PY-1000 Appearance and Dimensions



[ Figure 10. GTD-5000 & PY-1000 Appearance and Dimensions ]



## **11. Precautions prior to Installation**

### **11.1. Selection of installation site**

#### **(according to Industrial Safety and Health Regulations)**

Please install gas leakage detecting alarm in accordance with the following recommendations to secure maximum functionality.

- 1) Chemical facilities and facilities annexed thereto, such as compressor, valve, reactor and pipe joints dealing with flammable and/or toxic material installed in and out of buildings with high probability of gas leaks.
- 2) Location where gas is prone to stay due to vicinity of manufacturing facilities with fire source such as heating device.
- 3) Joint area and vicinity thereof for filling with flammable and toxic materials.
- 4) Substation, electricity distribution station, control room and the like placed within an explosion-proof area
- 5) Other areas where gases are prone to stay.

### **11.2. Selection of installation site**

#### **(according to High Pressure Gas Safety Control Act)**

Gas detector of gas leakage alarm should be installed as close as possible to a suspected area of gas leak. Exceptionally, the gas detector should be installed at one of following areas in case of the area in which ambient gas is prone to stay although no direct gas leakage is expected.

- 1) The gas leak detector installed outside of building must be positioned at an area where gas is prone to stay taking into account of direction of wind change, wind speed, gas specific gravity and the like.
- 2) The gas leak detector installed inside of building must be positioned at a lower part of the building if specific gravity of gas to be detected is heavier than that of air, and at a higher part of the building or close to ventilation if specific gravity of gas to be detected is lighter than that of air.
- 3) The alarm of gas leak detector must be installed at an area where the detector is mounted and where staffs are available at all the times.

### 11.3. Things to keep in mind when installing

The gas detector should be installed at water-free area, since the sensing parts of the gas detector is not hermetically sealed. If water such as raindrop permeates through the sensor, electrical fault or the like might happen. If the device is exposed to rain, it is highly recommended to provide additional protection using rain cover.

- 1) When installing, avoid the area where vibration and shock frequently happen. Vibration or shock might affect an output.
- 2) When installing, avoid the area where temperature and humidity are too high, which might cause malfunctioning.
- 3) When installing, avoid the area where electronic noise is generated. Also avoid the area where high frequency and high voltage happen, for example, the area near motor, pump or high voltage cable.
- 4) Install the gas detector the area where it is easy to repair and maintain, because periodic maintenance and calibration are required to ensure proper operation. Therefore, avoid the area where it is tricky to repair and maintain.

### 11.4. Cable Wiring

For preventing undesired influence by external noise, we recommend to use shield type cable. In addition, for preventing the device from damage upon impact, we recommend to user cable duct, conduct pipe and flexible and so on. It is recommended that making connection between cables be avoided. However, if inevitable, we recommend junction box be used when cables are connected.

In case of inner pressure-resistant packing method applied, please use the cable of which outer diameter is suitable for inner packing size and tightly fasten the cable gland in order not to cause any inflow of gas or flame.

When explosion proof metal piping, install sealing fitting and fill it with compound after completing piping work, in order to prevent any flow of flame caused by explosion or gas inside of metal pipe. All other connecting and combining parts should be water-proof.

## 12. Ordering Information

GAS NAME		MESURING RANGE	TLV-TWA
Acetic Acid	CH <sub>3</sub> COOH	0 ~ 30 ppm	10 ppm
Ammonia	NH <sub>3</sub>	0 ~ 75 ppm	25 ppm
Antimony Pentachloride	SbCl <sub>5</sub>	0 ~ 15 ppm	5 ppm
Arsetic Tafluoride	AsF <sub>3</sub>	0 ~ 9 ppm	3 ppm
Arsetic Pentafluoride	AsF <sub>5</sub>	0 ~ 9 ppm	3 ppm
Arsenic Tfichloride	AsCl <sub>3</sub>	0 ~ 15 ppm	5 ppm
Arsenic Pentachloride	AsCl <sub>5</sub>	0 ~ 15 ppm	5 ppm
Arsine	AsH <sub>3</sub>	0 ~ 0.3 ppm	0.05 ppm
Boron Trichloride	BCl <sub>3</sub>	0 ~ 15 ppm	5 ppm
Boron Tribromide	BBr <sub>3</sub>	0 ~ 9 ppm	3 ppm
Boron Trifluoride	BF <sub>3</sub>	0 ~ 9 ppm	3 ppm
Bromine	Br <sub>2</sub>	0 ~ 1 ppm	0.1 ppm
Chlorine	Cl <sub>2</sub>	0 ~ 3 ppm	1 ppm
Carbon Tetrachloride	CCl <sub>4</sub>	0 ~ 30 ppm	5 ppm
Carbon Monoxide	CO	0 ~ 150 ppm	25 ppm
Chlorine Tetrafluoride	ClF <sub>3</sub>	0 ~ 1 ppm	0.1 ppm
Diborane	B <sub>2</sub> F <sub>6</sub>	0 ~ 0.3 ppm	0.1 ppm
Dichlorosilane	SiH <sub>2</sub> Cl <sub>2</sub>	0 ~ 15 ppm	5 ppm
Disilane	Si <sub>2</sub> H <sub>6</sub>	0 ~ 15 ppm	5 ppm
Ethylene Oxide	C <sub>2</sub> H <sub>4</sub> O	0~30ppm	1ppm
Fluorine	F <sub>2</sub>	0 ~ 3 ppm	1 ppm
Germane	GeH <sub>4</sub>	0 ~ 2 ppm	0.2 ppm
Germanium Tetrachloride	GeCl <sub>4</sub>	0 ~ 15 ppm	5 ppm
Hydrazine	N <sub>2</sub> H <sub>4</sub>	0 ~ 10 ppm	0.01 ppm
Hydrogen	H <sub>2</sub>	0 ~ 2000 ppm	LEL=4%VOL
Hydrogen Bromide	HBr	0 ~ 9 ppm	3 ppm
Hydrogen Chloride	HCl	0 ~ 15 ppm	5 ppm
Hydrogen Cyanide	HCN	0 ~ 30 ppm	10 ppm
Hydrogen Fluoride	HF	0 ~ 9 ppm	3 ppm
Hydrogen Iodine	HI	0 ~ 5 ppm	2 ppm
Hydrogen Selenide	H <sub>2</sub> Se	0 ~ 0.2 ppm	0.05 ppm
Hydrogen Sulfide	H <sub>2</sub> S	0 ~ 30 ppm	10 ppm
Iodine	I <sub>2</sub>	0 ~ 1 ppm	0.1 ppm
Isopropyl Alcohol(IPA)	CH <sub>3</sub> CHOHCH <sub>3</sub>	0 ~ 2000 ppm	400 ppm
Molybdenum Fluoride	MoF <sub>6</sub>	0 ~ 9 ppm	3 ppm
Nitric Acid	HNO <sub>3</sub>	0 ~ 20 ppm	2 ppm
Nitrogen Monoxide	NO	0 ~ 100 ppm	25 ppm
Nitrogen Dioxide	NO <sub>2</sub>	0 ~ 15 ppm	3 ppm
Nitrogen Trifluoride	NF <sub>3</sub>	0 ~ 30 ppm	10 ppm
Nitrogen Tetraoxide	N <sub>2</sub> O <sub>4</sub>	0 ~ 15 ppm	3 ppm
Oxygen	O <sub>2</sub>	0 ~ 25% Volume	-
Ozone	O <sub>3</sub>	0 ~ 1 ppm	0.1 ppm

GAS NAME		MESURING RANGE	TLV-TWA
Phosgene	$\text{COCl}_2$	0 ~ 0.3 ppm	0.1 ppm
Phosphine	$\text{PH}_3$	0 ~ 1 ppm	0.3 ppm
Phosphorus Oxychloride	$\text{POCl}_3$	0 ~ 15 ppm	5 ppm
Phosphorus Pentafluoride	$\text{PF}_5$	0 ~ 9 ppm	3 ppm
Phosphorus Trichloride	$\text{PCl}_3$	0 ~ 15 ppm	5 ppm
Silane	$\text{SiH}_4$	0 ~ 15 ppm	5 ppm
Silicon Tetrachloride	$\text{SiCl}_4$	0 ~ 15 ppm	5 ppm
Silicon Tetrafluoride	$\text{SiF}_4$	0 ~ 9 ppm	3 ppm
Sulfur Dioxide	$\text{SO}_2$	0 ~ 10 ppm	2 ppm
Sulfur Tetrafluoride	$\text{SF}_4$	0 ~ 9 ppm	3 ppm
Sulfur Hexafluoride	$\text{SF}_6$	0 ~ 2000 ppm	
Tantalum Fluoride	$\text{TaF}_5$	0 ~ 9 ppm	3 ppm
Tetraethyl Orthosilicate	TEOS	0 ~ 15 ppm	10 ppm
Tin Tetrachloride	$\text{SnCl}_4$	0 ~ 15 ppm	5 ppm
Titanium Fluoride	$\text{TiF}_4$	0 ~ 9 ppm	3 ppm
Titanium Tetrachloride	$\text{TiCl}_4$	0 ~ 15 ppm	5 ppm
Trichlorosilane	$\text{SiHCl}_3$	0 ~ 15 ppm	5 ppm
Trimethoxy Phosphate	$\text{P}(\text{OCH}_3)_3$	0 ~ 15 ppm	2 ppm
Tungsten Hexafluoride	$\text{WF}_6$	0 ~ 9 ppm	3 ppm

### 13. Revision History

Version	Contents	Date
Rev. 0	Manual creation	2012.5.31
Rev. 1	MODBUS TCP Alarm write address addition.	2013.5.2
END		

This product and this instruction manual can be revised for performance improvement and users' convenience without prior notice.



GASTRON Co., LTD

18-8, Dogeumdanji 1-gil (Palgok 2-dong),  
Sangrok-gu, Ansan-si, Gyeonggi-do, Korea

Tel : 031-490-0800  
<http://www.gastron.com>

Fax : 031-490-0801  
[gastron@gastron.com](mailto:gastron@gastron.com)