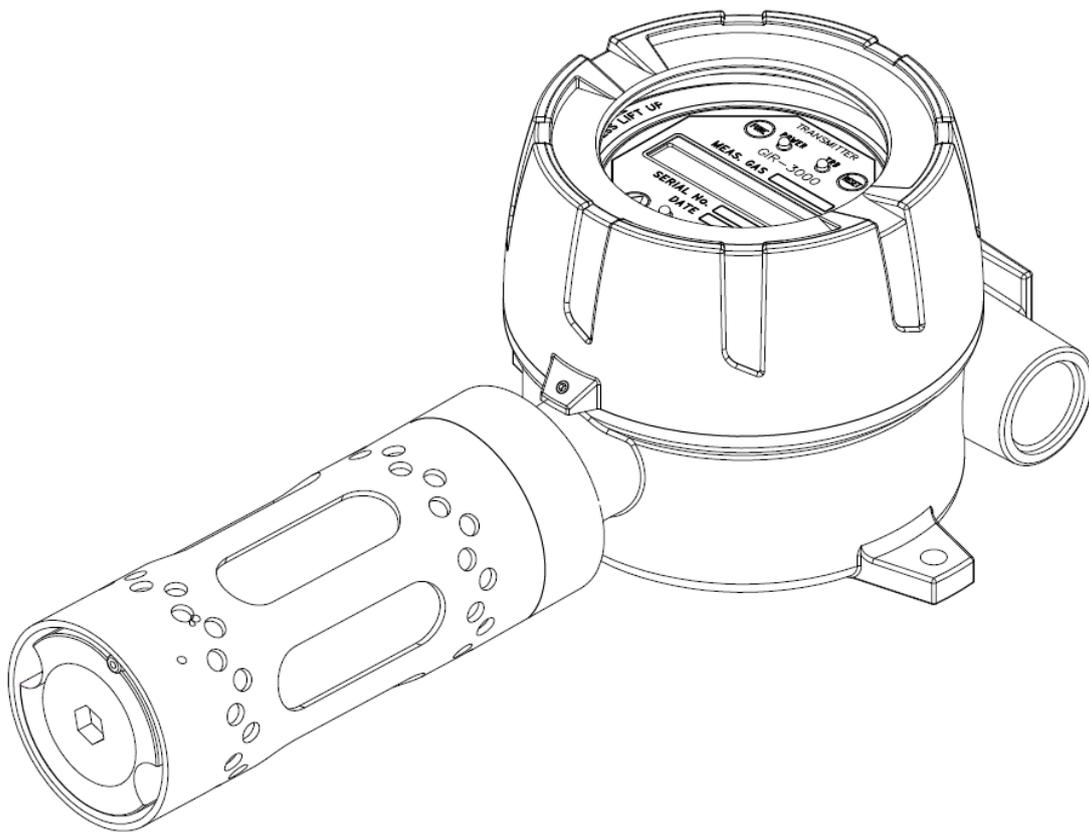


GIR3000

Instruction Manual

Revision: 2



Please read this manual carefully for proper use of the device

Thank you for purchasing the product of us Gastron Co., Ltd.

Gastron has been recognized from many consumers for its top quality and ease of use as a professional company of Gas detectors & Gas Monitors. We are constantly researching and striving to help consumers to find with required products nearby and to develop consumer satisfied Gas detectors. From now on, Gastron detectors will resolve all the troubles you have and satisfy your needs.

This manual contains method for the installation, operation method, and simple maintenance methods on GIR3000 IR Gas detector. Read it carefully and keep it for further reference in case you have questions.

If there are any problems with our products, please contact us at the address below.

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Note

- **Inspection and calibration are recommended at least once every 3 months to ensure accurate operation of the Gas detector using calibration gas depending on the type of gas.**
- **Negligence of periodic inspection and calibration may cause malfunction of the device due to the aging of the Sensor.**
- **Only qualified personnel with professional skills on Gas detector may disassemble the unit if necessary.**
- **For further information on Gas detector inspection and correction, please contact us at our technical department, e-mail or web site.**

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1. Introduction

The GIR-3000 is an infrared(IR)-type gas detector that is developed to prevent serious accidents caused by 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, CO or CO₂.

When the GIR-3000, IR-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 gas value on its integrated LCD or OLED. Additionally, it supplies DC 4-20mA standard output, isolated RS-485 communication signal, HART and relay contact signal on occurrence of gas alarms.

For standard output of DC 4-20mA, output receiver can support up to 500 meters distance away from gas detector to receive output signal(When CVVS or CVVSB 2.0 sq ↑ shield cable is used). And communication signal of RS-485 can be transmitted up to 1,000 meters (when RS-485 dedicated line is used).

2. Structure

The body of GIR-3000 is made of aluminum alloy and its structure is designed to be explosion-proof(Ex d IIC T6). The product can be installed in areas that may have flammable gas leaks and explosions. The integrated liquid crystal display(LCD or OLED) displays current gas leakage level on the spot.

The internal structure consists of LCD for gas level, connector delivering output such as measured value(DC 4-20mA) or isolated RS-485 communication signal(optional), HART communication and alarm signal, and two PCB boards. The outer structure is composed of sensing parts for detecting gas leakage and cable inlets(2ea). The gas detector can be calibrated from outside of the device using magnet-bar, which makes maintenance easier.

3. Specification

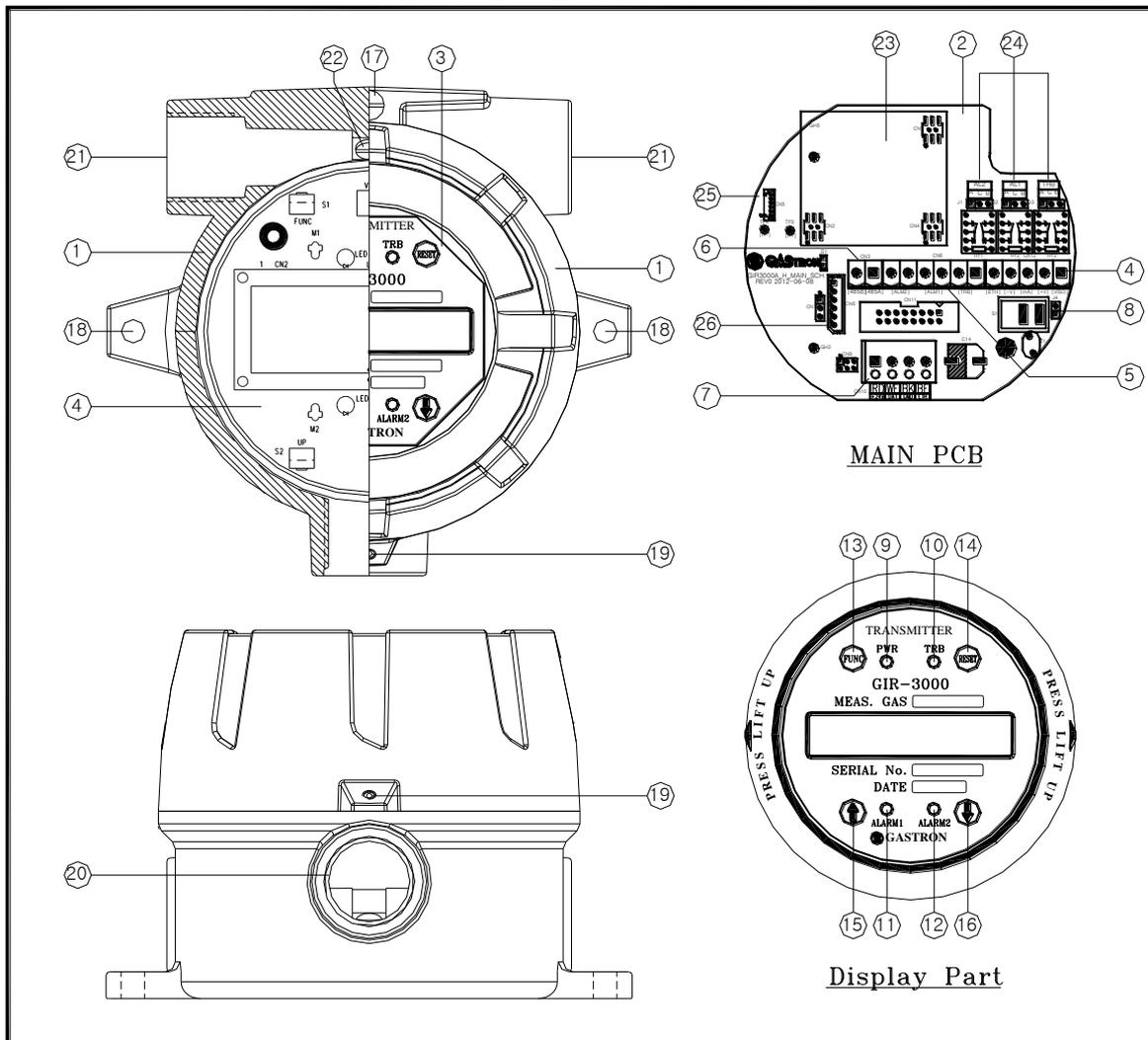
I T E M S	S P E C I F I C A T I O N
Measuring Type	Diffusion
Measuring Value Display	Local digital LCD(OLED) display
Means Value Display	Back light, 2-line/16-characters LCD & OLED
Approval	Ex d IIC T6, IP65
Detectible Gas	Combustible Gas
	Carbon dioxide(CO ₂)
	Carbon monoxide(CO)
Measuring Method	Non-Dispersive Infrared(NDIR Cell)
Measuring Range	Combustible Gas : 0~10,000ppm / 0~100% LEL / 0~100% VOL
	CO ₂ : 1.0% ~ 100% VOL
	CO : 5% ~ 100% VOL
Response Time	90% of full scale in less than 10 seconds
Accuracy	±3% / Full scale
Zero Drift	Less than 2% full scale
Operating Temperature	-20 to 60°C
Operating Humidity	0 to 99% RH (Non-condensing)
Analogue Signal Output	Measurement output : 4-20mA DC/Full Scale
	Diagnostic output : 3mA
	Calibration output : 3mA
	Faulty output : 2mA
HART ®Interface	HART REV7 / Optional Board (*1)
Alarm Signal Output	SPST Signal of Relay contact : 250V/1A
Calibration Work	Magnetic interface to configure alarm
Cable Connection Length	Max. 500m : 4~20mA signal
	Max. 1000m : Isolated RS-485 Signal
Power Supply	18-31V DC (DC 24V normal) / Max. 400mA
Conduit Connection	1/2" or 3/4"PF, NPT(Standard : 3/4" PF)
Signal cable Connection	Power source + current : CVVS or CVVSB 2.0sq ↑ x 3wires shield
	RS-485 communication : 1 par(UL2919 RS-485)
Option	HART ® Interface board
	GTL-100 (explosion proof LED)
	Rain cover
Dimensions	156(W) x 322(H) x 110(D) mm
Weight	Approx. 3.0kg

[Table 1. GIR3000 Specification]

*Note 1) Regarding HART, refer to document on GIR3000 HART® Field Device Specification.

4. Name of Components and Main features

4.1. Components



[Figure 1. GIR3000 Components]

No.	Name	No.	Name
1	HOUSING	14	RESET SWITCH
2	MAIN PCB	15	↑ SWITCH
3	DISPLAY PCB	16	↓ SWITCH
4	POWER/SIGNAL TERMINAL	17	EXTERNAL EARTH (4sq ↑)
5	ALARM SIGNAL TERMINAL	18	MOUNT HOLES (2-Ø7)
6	RS-485 SIGNAL TERMINAL	19	COVER FIXED SCREW
7	SENSOR TERMINAL	20	SENSOR THREAD
8	POWER SWITCH	21	CABLE INLET
9	POWER LED LAMP	22	INTERNAL EARTH (2sq ↑)
10	TROUBLE LED LAMP	23	RS-485 Module or HART Module (Option)
11	ALARM1 LED LAMP	24	Relay Contact Type Selection
12	ALARM2 LED LAMP	25	Warning Light Connector
13	FUNCTION SWITCH	26	Program Downloading Connector

[Table 2. Components Reference Table]

4.2. Components Description

No.	Name of component	Description
1	Housing	Protecting sensors and PCB boards equipped inside the device housing against environmental variations and shocks
2.	Main PCB	Amplifying the output signal generated by sensor, converting it to standard output of DC 4-20mA and transmitting converted signal. And transmitting isolated RS-485 communication signal and alarm relay contact signal. Also delivering data which will be shown in display panel.
3.	Display PCB	Showing data sent by main PCB in LCD or OLED. Also displaying current event status with using power lamp, alarm lamp and trouble lamp.
4.	Power/Signal Terminal	CN12 is composed of connection terminal for supplying DC18-24V power and connection terminal for standard output (viso, +, mA, -).
5.	Alarm signal Terminal	CN8 is an alarm signal connection terminal which outputs relay contacts of trouble, alarm1 and alarm 2.
6.	RS-485 signal terminal	CN3 is a signal connection terminal(A,B) for isolated RS-485 communication.
7.	Sensor terminal	C10 is a sensor connection terminal(RD, WH, BK, BE).
8.	Power on/off switch	Turning on or off power of gas detector. The switch should be turned off when cable work or A/S is performed. After finishing those works, the switch can be on.
9.	Power lamp	When power switch turns on, this power lamp light will be on.
10.	Trouble lamp	When fault occurs in circuit or sensor sensitivity, the trouble lamp will be on.
11.	Alarm1 lamp	The alarm1 lamp turns on when the measured value of gas becomes over alarm1 level on gas leakage.
12.	Alarm2 lamp	The alarm2 lamp turns on when the measured value of gas becomes over alarm2 level on gas leakage
13.	Function switch	In order to set parameters, this function switch is used to allow the device to enter program mode by touching it with magnet-bar for 2 seconds or more(Program mode, Calibration mode and Test mode are also provided). The switch is also used to input and set data.
14.	Reset switch	Reset switch can be used to cancel setting parameter or return back to previous state by touching it once with magnet bar. (Each time it is touched with magnet bar, the mode will be switched back to the immediate previous mode)
15.	↑ (Up) switch	This switch is used to transit mode or adjust number by touching it with magnet bar. The mode will be switched in a forward direction and the number in an increasing direction.

No.	Name of component	Description
16.	↓ (Down) switch	This switch is used to transit mode or adjust number by touching it with magnet bar. The mode will be switched in a backward direction and the number in a decreasing direction.
17.	External earth	The gas detector must be connected to ground via the external earth point to protect it against external noises or high voltage.
18.	Mount hole(ø7×2ea)	These holes are used to fix the gas detector on wall or other installed places.
19.	Cover fixed screw(M4)	The gas detector's housing body and housing cover must be fixed with hex sockethead cap screw after they are assembled in order to prevent separation which might be caused by external shocks.
20.	Sensor thread	Attachment places where IR gas Sensor(Detector) is attached.
21.	Cable inlet	These cable inlets are used to supply power and input & output measured data signal during installation. PF 3/4" is basically provided.
22.	Internal earth	The gas detector must be connected to ground via the internal earth point to protect it against external noises or high voltage.
23.	RS-485 Module / HART Module (Optional)	This is a connector which enables the detector to communicate with PC or PLC through isolation-type RS-485 communication protocol or HART. To activate RS-485 communication, communication address must be assigned to the detector properly.(the value is set to be 1 by default) For using HART, polling-address and tag no. must be set appropriately.
24.	Relay Contact Type Selection	<p>It enables the user to select relay contact between A and B.</p> <p>When the detector is not ENERGIZER MODE, it will operate with A contact(Normal Open) if the spot marked by A silk is connected by jumper wire. It will operate with B contact(Normal Close) if the spot marked by B silk is connected by jumper.</p> <p>The other way, when the detector is ENERGIZER MODE, it will operate with B contact if the spot marked by A silk is connected by jumper wire. It will operate with A contact(Normal Close) if the spot marked by B silk is connected by jumper.</p>
25.	Warning Light Connector (Optional)	This connector will be connected only if LED needs to be used.
26.	Program Downloading Connector	The connector enables the user to download program to the product.

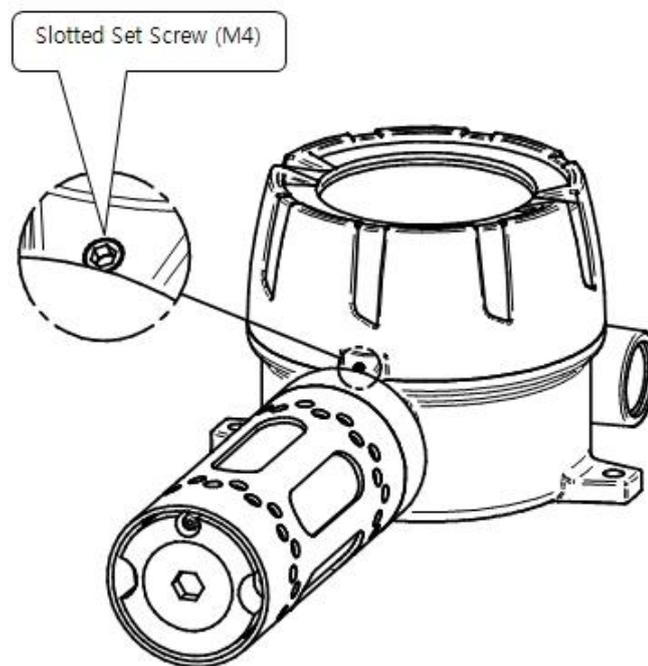
[Table 3. Detailed Description about components of the GIR-3000]

5. Terminal wiring diagram

Warning Never install, uncover, or manipulate the Detector other than authorized personnel or installation/repair service person from Gastron, or serious loss of life and property damage such as fire or explosion may occur. In addition, check around for explosive Gas or flammable substances, followed by turning OFF before any work.

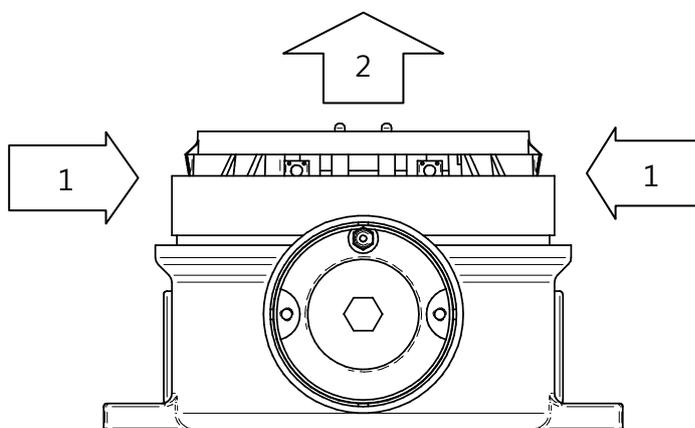
5.1. Separation of Detector Body and Cover

The Gas Detector Cover can be removed by turning the Cover fastening Slotted Set Screw (M4 x 1ea) three to four rotations anti-clockwise using hex wrench (M2), followed by turning the Cover counterclockwise by hand. After the separation of Cover, the LCD indicator appears.



[Figure 2. Slotted Set Screw]

After the Cover removal, remove the Display Part as follows.



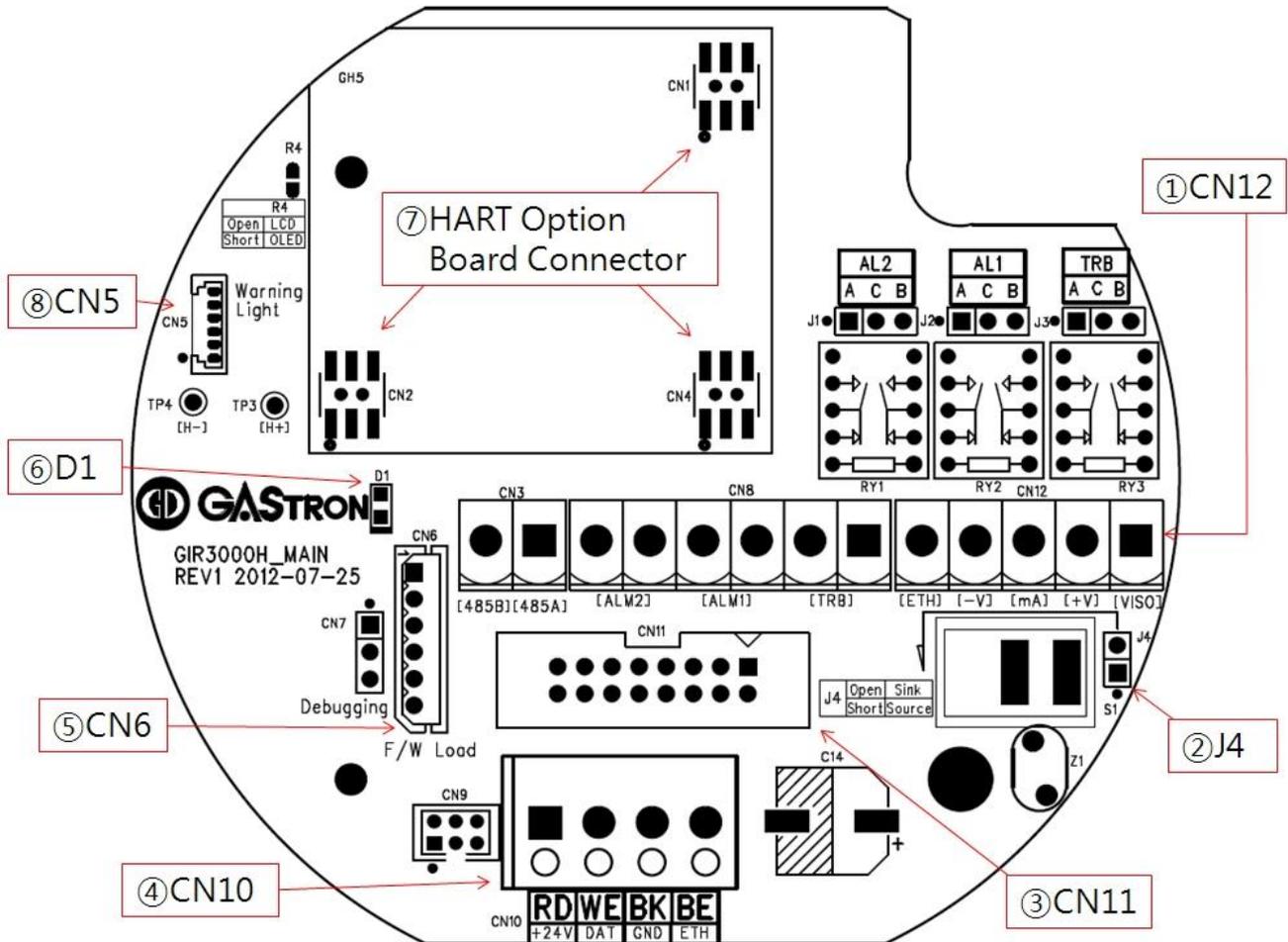
[Figure 3. Display Parts removal]

- ① Click the left and right retainer rings on the front of the LCD display inwards at the same time.
- ② While holding, pull the Display Part forward to separate from the Gas detector Body.
- ③ With the Display Part removed, the Main PCB is shown under the Detector Body.

5.2. Main PCB configuration

5.2.1. Main PCB configuration

With the Display Part removed, the Main PCB terminal arrangement is shown as the following Figure.



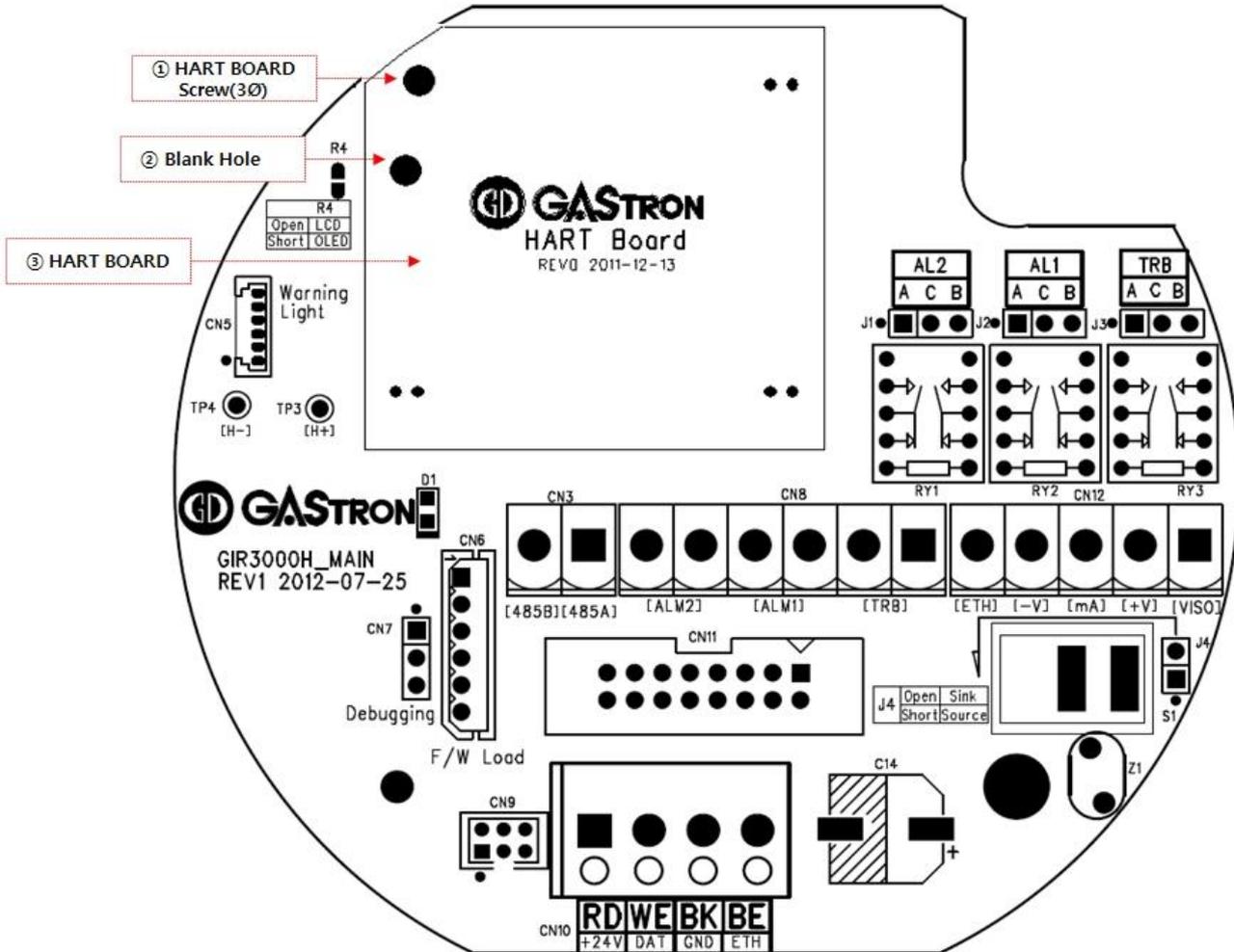
[Figure 4. Main PCB terminal arrangement]

No	Name	Description
1	CN12	Power & Output Signal Terminal
2	J4	4~20mA Source / Sink selection jumper (ON: Source Type, OFF: Sink Type)
3	CN11	Display LCD Connector
4	CN10	Sensor Connector
5	CN6	Program download Connector
6	D1	Status LED (blinks every second in normal operation)
7	CN1,CN2,CN4	HART Option Board Connector
8	CN5	Warning Light(GTL-100) Interface Connector

[Table 4. Main PCB main Parts Description]

5.2.2. HART Board configuration

HART Board consists of Option Board, and is connected using CN5, CN6, CN7 terminals of Main PCB and the HART Board Screw at the top left.



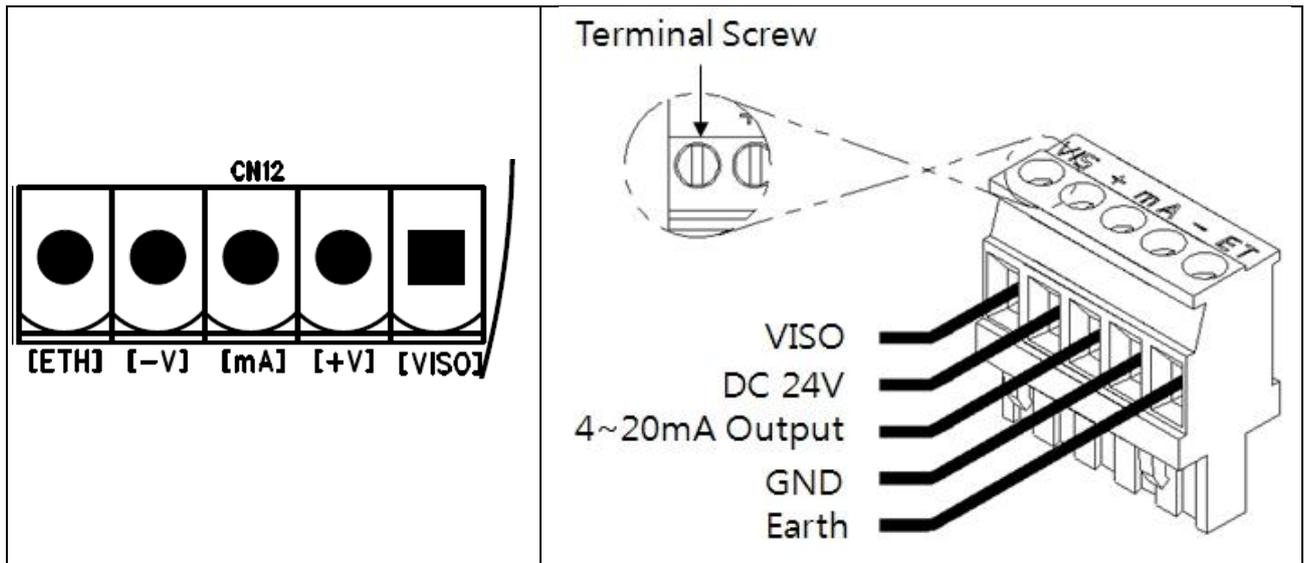
[Figure 5. HART Board constituting Main PCB]

No	Name	Description
1	HART Board Screw	Constructed using 3Ø Screw
2	Blank Hole	Reserve Hole
3	HART Board	Option Board for HART Interface

[Table 5. HART Board main Parts description]

5.3. Main PCB terminal description and wiring method

If you remove the Display Part, there is the Terminal Block under the Main PCB as shown in the following Figure 6. The Terminal Block can be removed from Main PCB by holding and pulling upward by hand. Unscrew the 5 terminal set screws above the separated **Terminal Block CN12 (VIS, +, mA, -, ETH) Connector** counter-clockwise with a \ominus screwdriver; connect DC18-24V power to +, -; connect Signal Cable to mA; tighten the terminal set screws clockwise to keep the terminals in place; and insert it like before the removal.



[Figure 6. CN12 Terminal structure]

No	PCB Silk	Pin Name	Description	
			4~20mA Source Drive (J1 Jumper ON)	4~20mA Sink Drive (J1 Jumper OFF)
1	VISO	VIS	N.C	4~20mA Sink In(+)
2	+24V	+	+24V / POWER (+)	
3	mA	mA	4~20mA Source Out	4~20mA Sink Out(-)
4	GND	-	GND / POWER (-)	
5	ETH	ET	EARTH	

[Table 6. CN12 connector description]

Note 1) Be sure to use CVVS or CVVSB 2.0sq ↑ Shield Cable before Terminal construction.

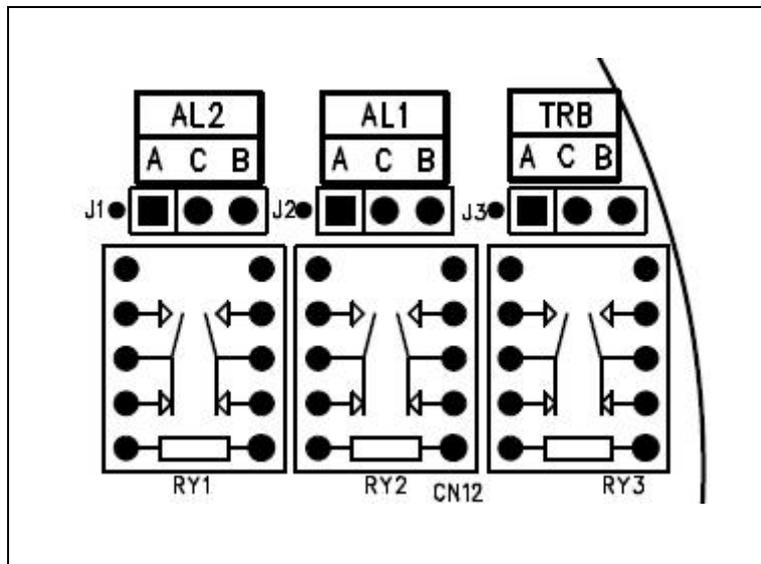
Note 2) Fasten Terminals based on +24V of 2Pin to connect the 4Pin Terminal of existing conventional GIR3000.

5.3.1. Relay drive type wiring method

The Relay drive type of GIR-3000 can be operated by two ways.

There is De-Energized Mode and Energized Mode.

Main PCB is marked A, B silk to set Relay drive type and connect using Jumper as you want Relay drive type.



[Figure 7. Main PCB Relay part Configuration]

Drive type	A Contact	B Contact
De-Energized	Connect Jumper to (A-C)	Connect Jumper to (B-C)
Energized	Connect Jumper to (B-C)	Connect Jumper to (A-C)

[Table 7. Relay drive type description]

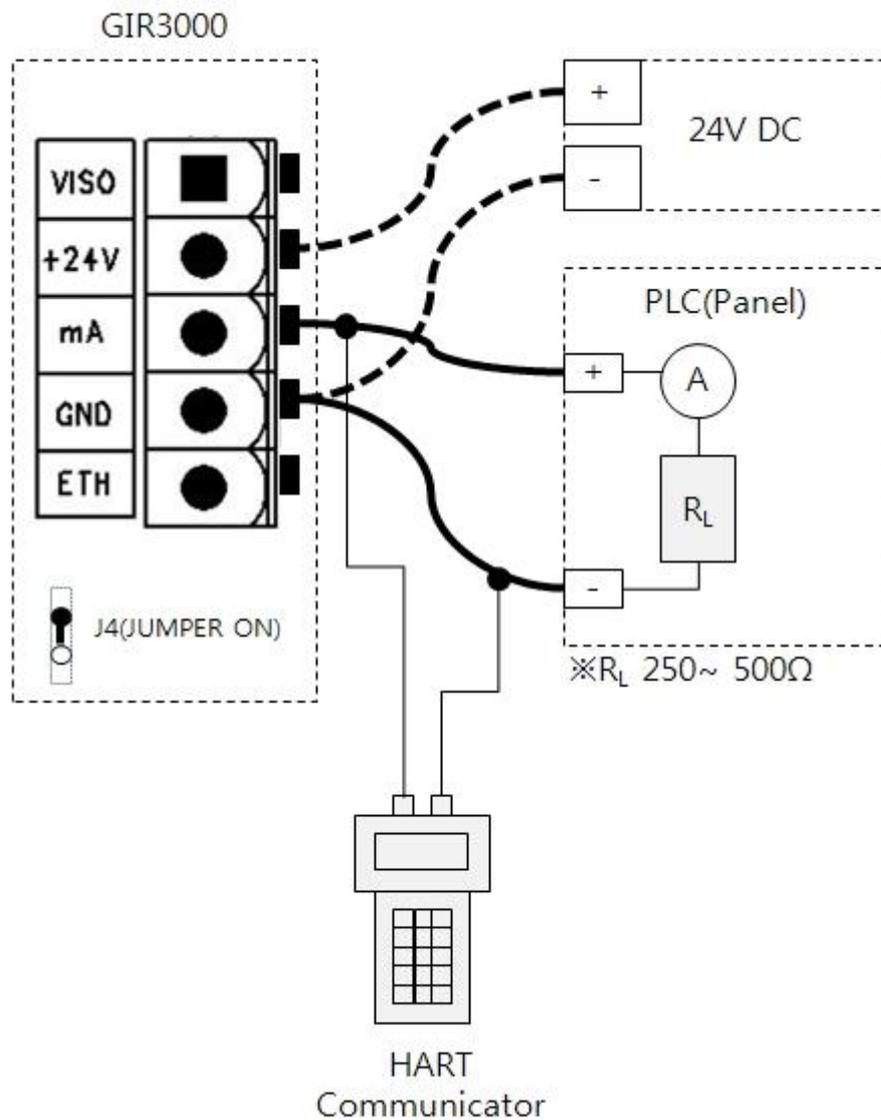
Note 1) Be sure to use the same J1, J2, J3.

Note 2) Conventional GIR-3000 can be operated DE-Energized Mode.

5.3.2. 4~20mA Source drive type wiring method

Connect 4~20mA Signal Terminal of PLC to 'mA' of GIR3000. GND Terminal is used in common with the power. Turn J4 Jumper ON.

※ HART Communicator can be used only in models utilizing HART Option Board.



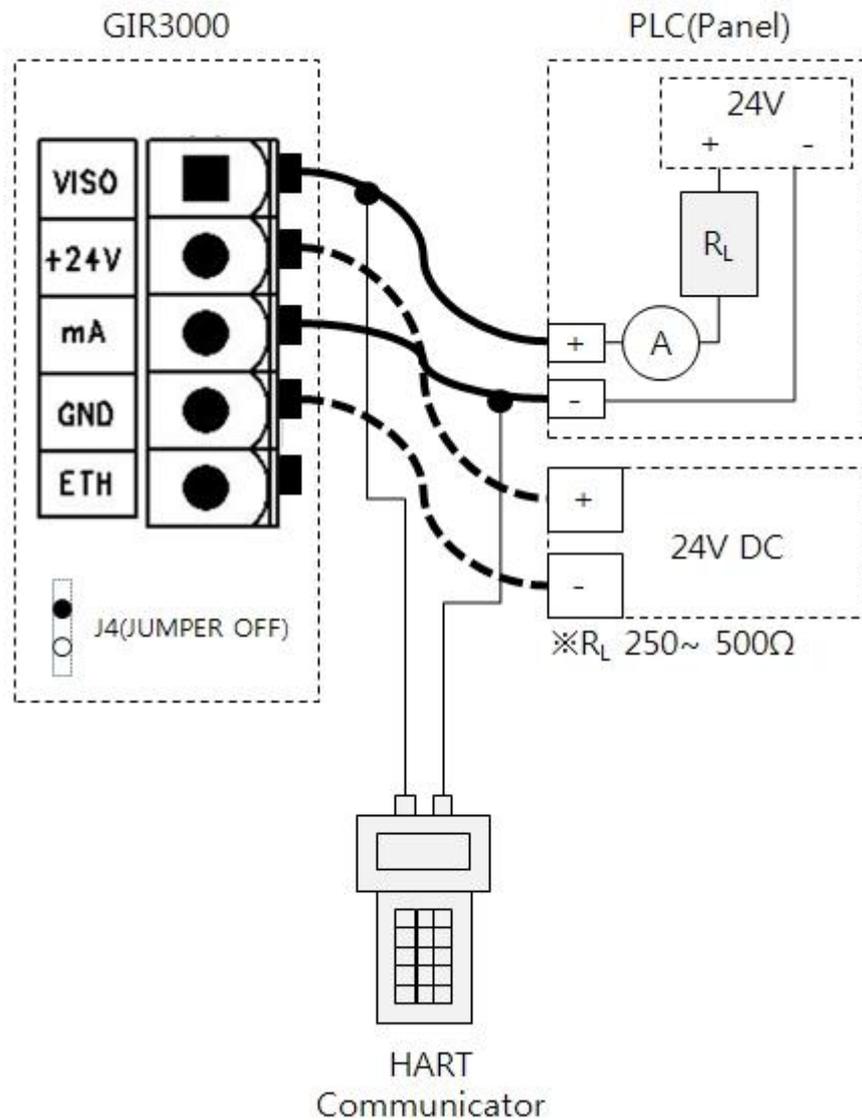
[Figure 8. Analog 4~20mA Source Configuration]

5.3.3. 4~20mA Sink drive type wiring method

Connect 4-20mA Sink Output (+) Terminal of PLC to VISO Terminal; and (-) Terminal to 'mA' Terminal.

Turn J4 Jumper OFF.

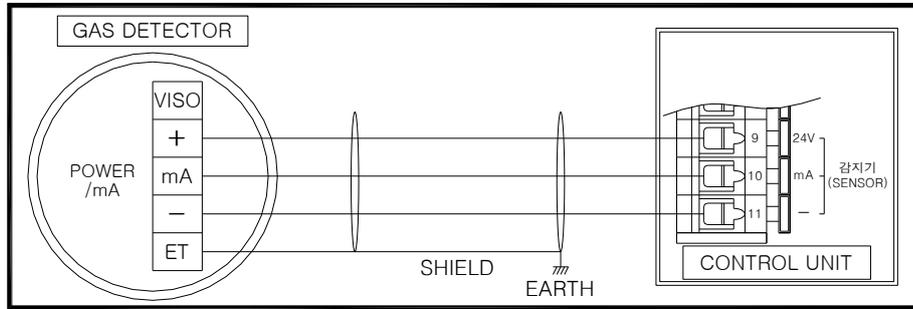
※ HART Communicator can be used only in models utilizing HART Option Board.



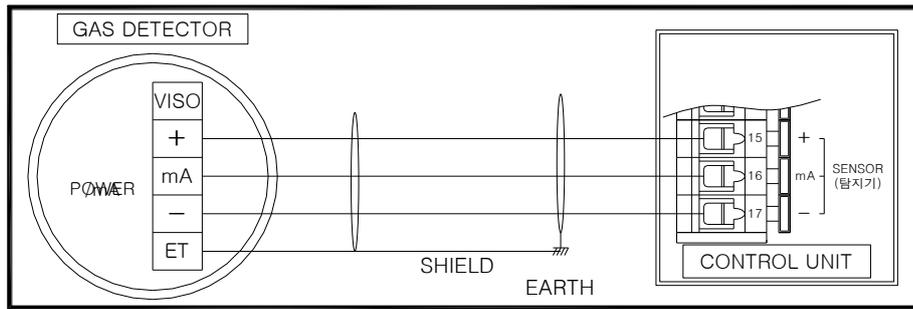
[Figure 9. Analog 4~20mA Sink Configuration]

5.3.1. Connection method with our main Control Unit

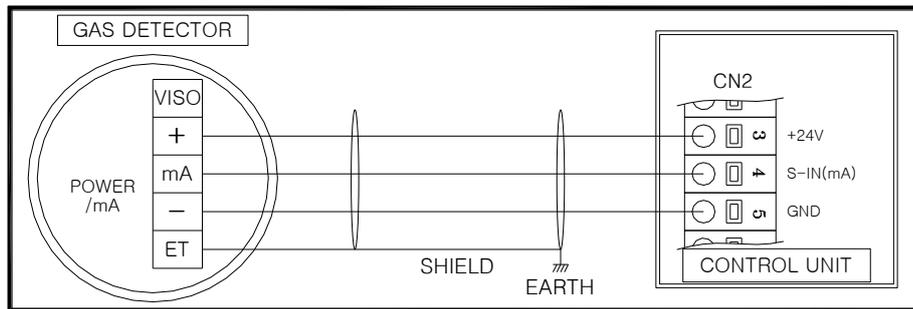
Connect CN12 (VISO,+, mA, -, ET) Connection Terminal of the Gas Detector and the Control Unit with reference to the Figure below. (See product manual for each Control Unit.)



(GTC-100A Series Control unit)

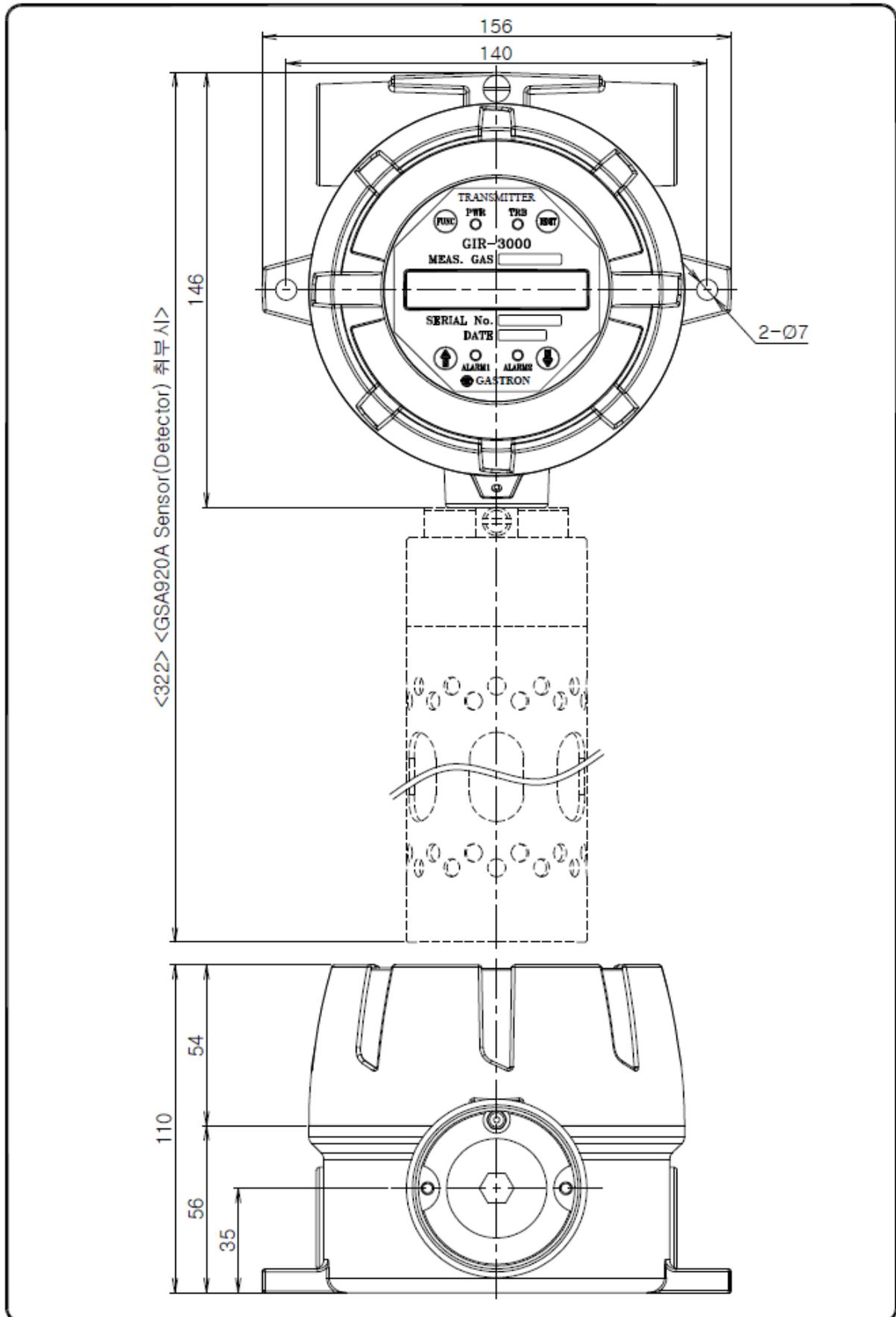


(GTC-200A/210A Series Control unit)



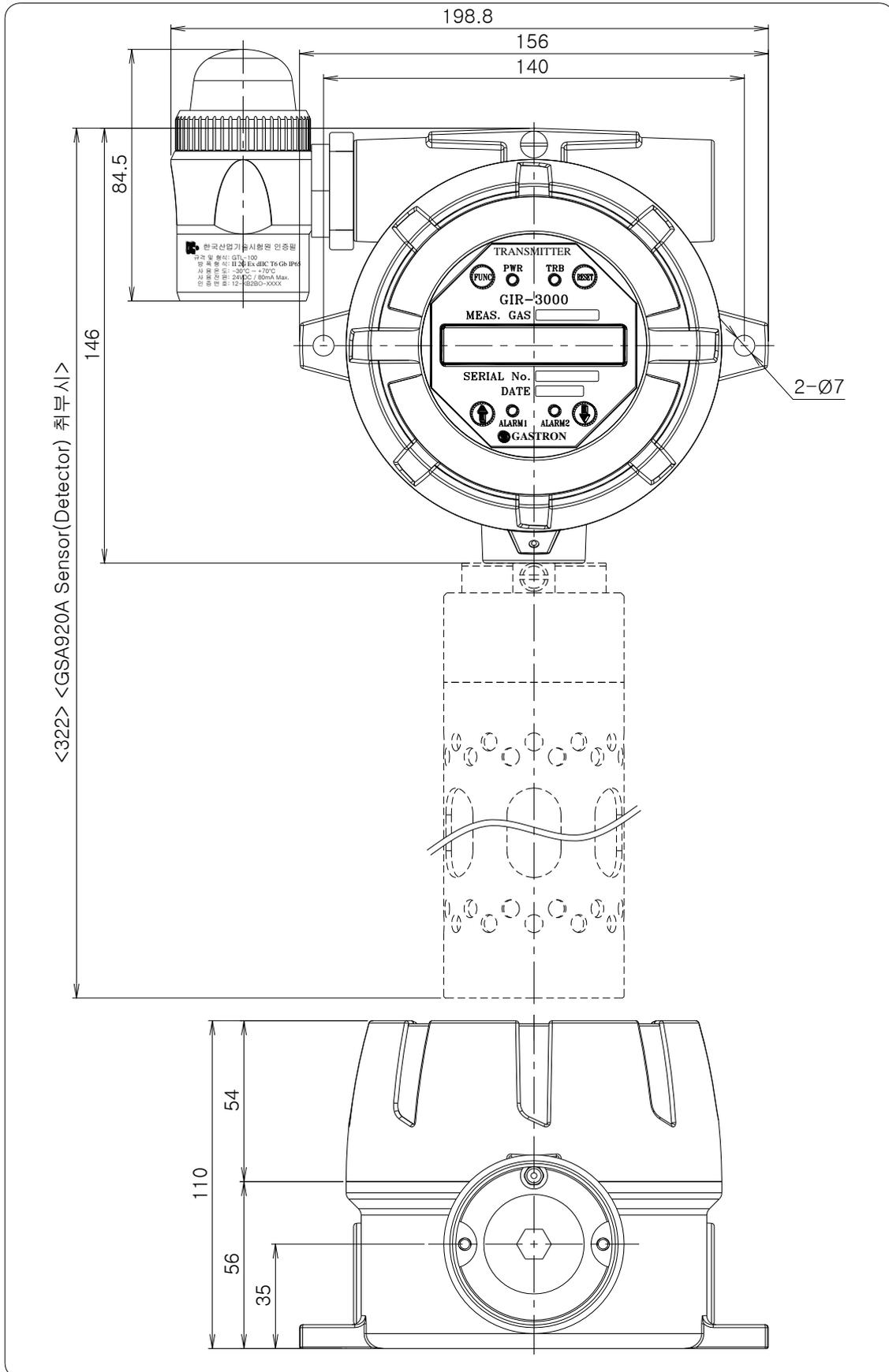
(GTC-510A/520A Series Control unit)

6. Standard Type outside view and Dimensions



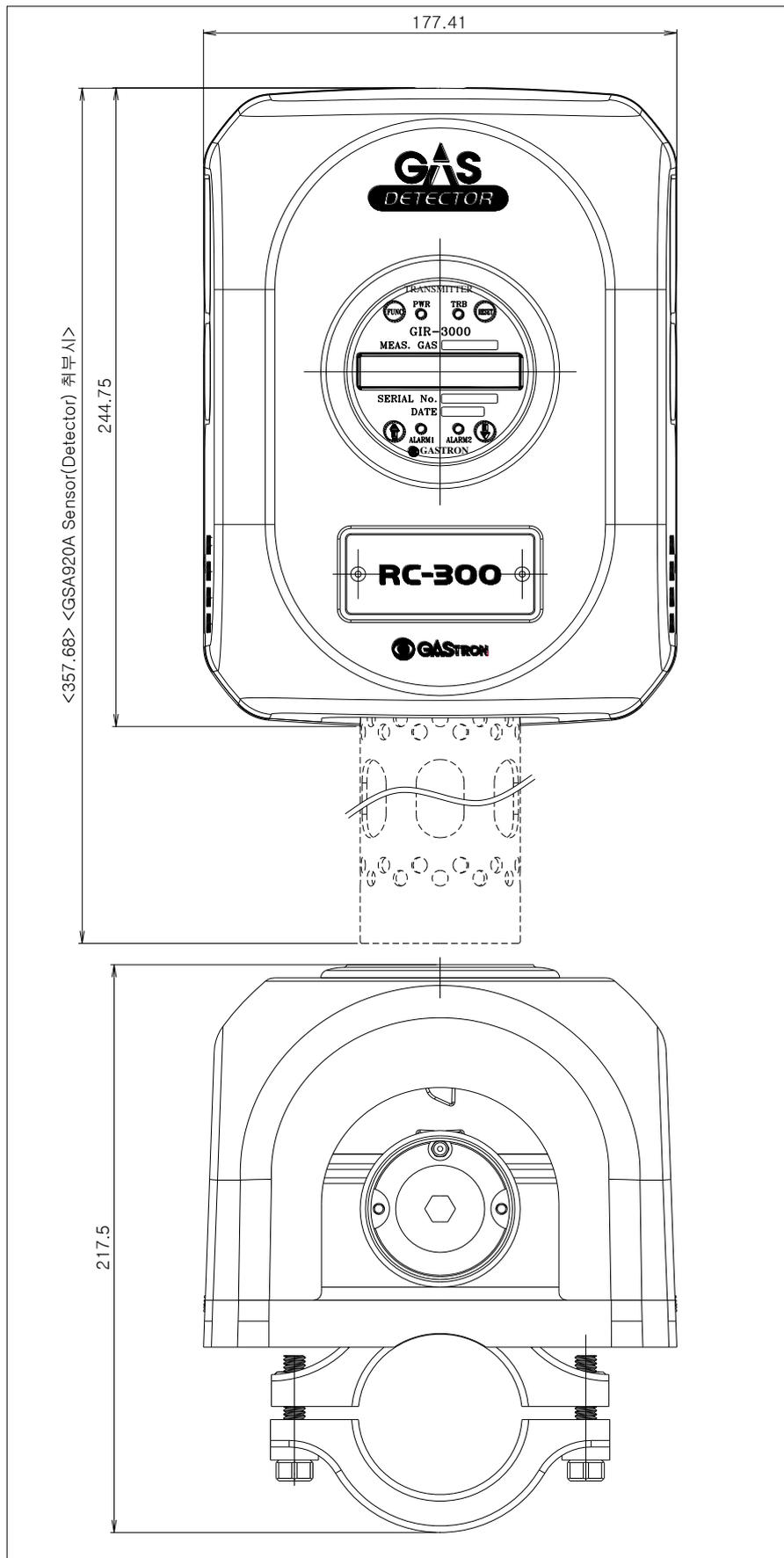
[Figure 10. GIR3000 outside view]

7. Warning light type: Outside view and Dimensions



[Figure 11. GIR3000 Warning Light type outside view]

8. Raincover type: Outside view and Dimensions



[Figure 12. GIR3000 Raincover type outside view]

9. Menu Configuration Table

LEVEL1	LEVEL2		DEFAULT
	NAME	PARAMETER	
PROGRAMMABLE MODE	GROUP OF GAS SEL (GROUP OF GAS SELECT)	HC/PROPANE/CO/CO2	HC
	UNIT & TAG SEL. (UNIT & TAG SELECT)	%/%LEL/PPM/PPB	%LEL
	DECIMAL POINT	0.100/1.00/10.0/100	100
	HIGH SCALE ADJ. (HIGH SCALE ADJUST)	1~10000	100
	PASSWORD SET	00~99	00
CALIBRATION MODE	CALIBRATION [ZERO & SPAN]	ZERO CALIBRATION [NO,YES]	[NO]
		ZERO GAS [0]	
		ZERO PROCESSING [SUCCESS / FAIL]	
		CALIBRATION DATA [0]	
		SPAN CALIBRATION [NO , YES]	[NO]
		SPAN GAS VALUE [0]	50% of Full Scale
		[CH4] SPAN GAS 000 [0]	
		SPAN PROCESSING [SUCCESS / FAIL]	
		CALIBRATION DATA [0]	
ALARM PROGRAM MODE	ALARM OPERATING	[AUTO/MANUAL]	AUTO
	ALARM RELAY TYPE	DE-ENERGIZED/ENERGIZED	DE-ENERGIZED
	FAULT RELAY TYPE	DE-ENERGIZED/ENERGIZED	DE-ENERGIZED
	ALARM1 TYPE SEL. (ALARM1 TYPE SELECT)	[INCREASE/ DECREASE]	INCREASE
	ALARM1 LEVEL ADJ (ALARM1 LEVEL ADJUST)	1~Full Scale ADJ	20
	ALARM1 DEAD BAND	0.0~ Adj within 10% of Full Scale	1.0

LEVEL1	LEVEL2		DEFAULT
	NAME	PARAMETER	
ALARM PROGRAM MODE	ALARM1 RELAY CTL (ALARM RELAY CONTROL)	[ON / OFF]	ON
	ALARM1 TIME SET	[01]SEC , 0~60 ADJ	01
	ALARM2 TYPE SEL. (ALARM2 TYPE SELECT)	INCREASE/ DECREASE	INCREASE
	ALARM2 LEVEL ADJ (ALARM2 LEVEL ADJUST)	1~Full Scale ADJ	40
	ALARM2 DEAD BAND	0.0~ Adj within 10% of Full Scale	1.0
	ALARM2 RELAY CTL (ALARM RELAY CONTROL)	[ON / OFF]	ON
	ALARM2 TIME SET	[01]SEC , 0~60 ADJ	01
TEST MODE	TROUBLE RELAY	[ON / OFF]	OFF
	ALARM RELAY	[ON / OFF]	OFF
	OUTPUT SIGNAL	[4mA / 20mA]	4mA
	[TEST]	[0] 0~Full Scale ADJ	0
IR SENSOR DATA MODE	M(MANUAL)	0.XXXX / 0.XXXX X.XXX% + XX.XX%+XX	-
	Z(ZERO) S(SPAN)	0.XXXX / 0.XXXX 0.XXXX / 0.XXXX	-
	Z / S ZS RAT(RATE)	XX.X / XX.X XX.X %	-
	A(AUTO)	0.XXXX / 0.XXXX [X]X.XXX% , XX.X	-
	VIN MIN / MAX	XX.X V XX V / XX V	-
VERSION MODE	GIR3000A GSA920A	V XXX V X.XX	-
	H/W VERSION	[REV 2]	-
	HART DEVICE	[REV 1]	-
	HART REV	[REV 7]	-
MAINTENANCE MODE	CROSS SENS. TYPE (CROSS SENSITIVITY TYPE)	X.X / X.XX	X.X
	CROSS SENS. ADJ. (CROSS SENSITIVITY ADJUST)	[1.0] X GAS , 0.1~5.0 ADJ	1.0
	SET – UP MODE	[ON / OFF]	OFF
	ZERO SKIP BAND	[ON / OFF]	ON

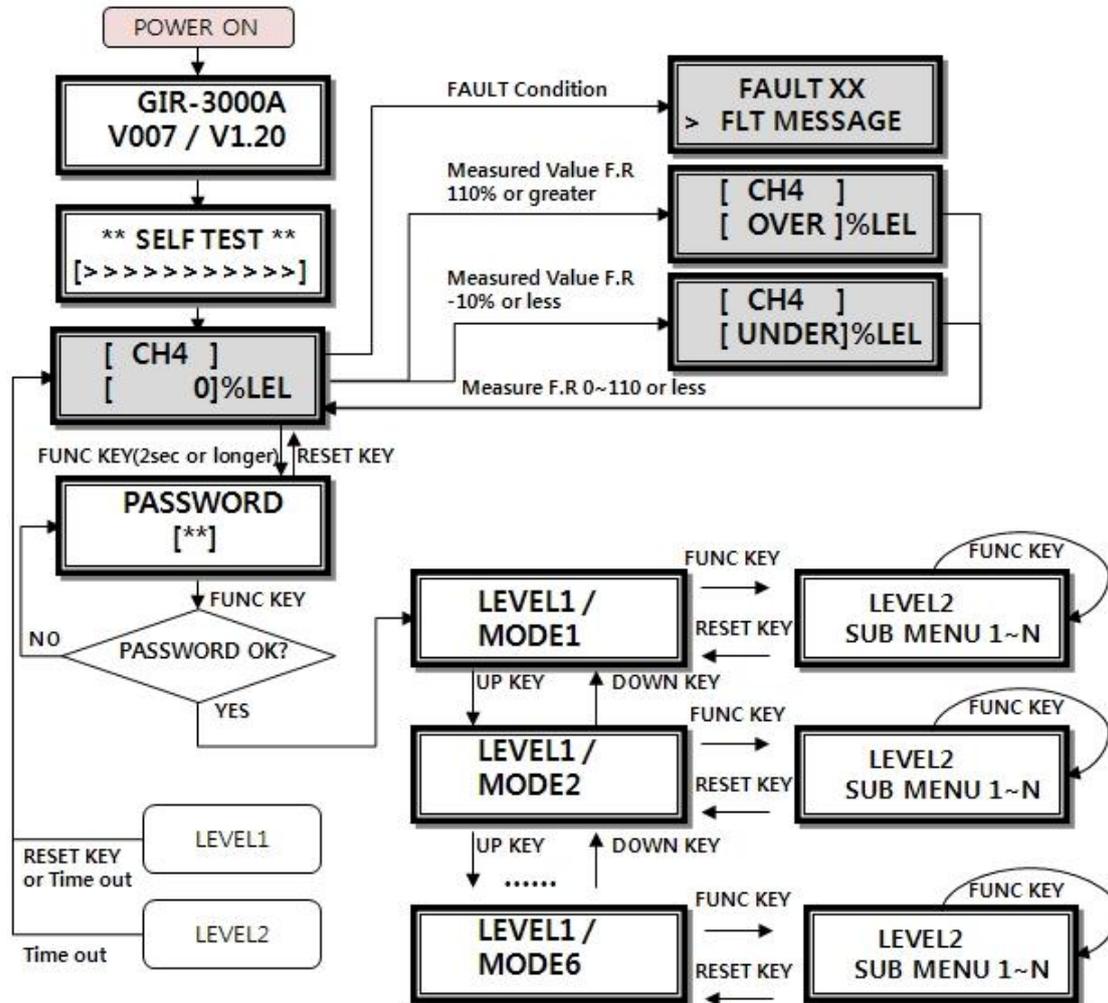
LEVEL1	LEVEL2		DEFAULT
	NAME	PARAMETER	
MAINTENANCE MODE	ZERO SKIP	[0.0]%FRNG , Adj within 10% of Full Scale	0.0
	OPER. DELAY TIME (OPERATION DELAY TIME)	[0]SEC , 0~60 ADJ	0
	TEMP COMPENSATI (TEMPERATURE COMPENSATION).	[ON / OFF]	ON
	AUTO ZERO MODE	[ON / OFF]	ON
	BASE ZERO MODE	[ON / OFF]	ON
	REF COMPENSATI. (REFERENCE COMPENSATION)	[ON / OFF]	ON
	FLT8 PROTECTION (FAULT8 PROTECTION)	[ON / OFF]	OFF
	UNDER CHECK	[ON / OFF]	OFF
	W-LIGHT MODE (WARNING-LIGHT MODE)	[STEADY / BLINKING]	STEADY
	MAINTANCE-LEVEL	[0] , 0~Full Scale ADJ	0
	ENGINEERING MODE	[ON / OFF]	OFF
	EMERGE. TIME OUT (EMERGENCY TIME OUT)	[ON / OFF]	OFF
485MODBUS MODE	485 BOARD	[EMPTY/CHECK]	-
	ADDRESS NO.	[01] , 0~64 ADJ	01
DEVICE MODE	HART BOARD	[EMPTY/CHECK]	-
	P-ADDR LOOP CUR (POLLING-ADDRESS LOOP CURRENT)	[0] [ON/OFF]	0 , ON
	FIXED CUR. MODE (FIXED CURRENT MODE)	[DISABLE]	DISABLE
	DEVICE CODE	[0xE1C6]	0xE1C6
	SERIAL NUMBER	[0000000]	0000000
	TAG	[GIR-0001]	GIR-0001
	LONG TAG	[GIR-0001-LT]	GIR-0001-LT
	DESCRIPTION	[GASTRON GIR3000]	GASTRON GIR3000
	MESSAGE	[IR GAS DETECTOR]	INFRARED GAS DETECTOR
	FINAL ASSEMB. NUM (FINAL ASSEMBLE NUMBER)	[0] , 0~100 ADJ	0

[Table 8. Menu Configuration Table]

10. Detector activation Flow and KEY operation

10.1. Sensor activation Flow

Timeout of Level1 and Level2 is 10 seconds, and 1 hour in the Calibration and Test Mode of Level2.



[Figure 13. Detector workflow]

10.2. Sensor KEY configuration and description

Item	Name	Description
FUNC	Function Key	Sensor Mode entry function (more than 2 seconds of touch with Magnet-bar in Measuring Mode). Entry to the next step of Level2 and storage of setting value.
RESET	Reset Key	Moving back to the previous step before the entered LEVEL
↑	Up Key	Change to the next step after LEVEL1, and plus change of Level2 setting.
↓	Down Key	Change to previous step before LEVEL1; minus change of Level2 setting.

※ Sensor Power ON followed by simultaneous input of Reset Key and Function Key will result in Factory Set in internal setting.

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> * # [CH4] [UNDER]%LEL </div>	<ul style="list-style-type: none"> ➤ When the measured gas value falls under 90% of preset value, a message "UNDER" will be displayed in every second. In this case, standard output will fall to under 2mA. ※ This function can be available only if UNDER function turns ON. (Refer to page 34 regarding turning on this function)
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> FAULT 04 > SEN-COM T/O </div>	<ul style="list-style-type: none"> ➤ If a fault condition exists, the fault code and message will be displayed. ➤ In this case, standard output will fall to under 2mA. ➤ Left-hand side figure is an example screen of fault 04 state which indicates that no sensor is connected.

11.3. How to Set PROGRAMMABLE MODE

<div style="border: 2px solid black; padding: 5px; width: fit-content;"> PROGRAMMABLE MODE </div>	<ul style="list-style-type: none"> ➤ After password has been confirmed, the detector will go into level1 mode. ➤ Select PROGRAMMABLE MODE by touching "↑" or "↓" switch. ➤ At this moment, if function key is touched, the detector will go into programmable mode Level2 submenu.
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> GROUP OF GAS SEL [HC] </div>	<ul style="list-style-type: none"> ➤ This mode is to set gas group. Whenever "↑" or "↓" switch is touched, gas group name will be changed. (HC/PROPANE/CO/CO2)
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> TYPE OF HC [CH4] </div>	<ul style="list-style-type: none"> ➤ This mode is to set gas name. Whenever "↑" or "↓" switch is touched, gas name will be changed.
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> UNIT & TAG SEL. [%LEL] </div>	<ul style="list-style-type: none"> ➤ This mode is to set measurement unit. Whenever "↑" or "↓" switch is touched, unit will be changed. (% / %LEL / PPM / PPB)
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> DECIMAL POINT [100]%LEL </div>	<ul style="list-style-type: none"> ➤ This mode is to set decimal point. Whenever "↑" or "↓" switch is touched, the decimal point will be changed.(0.100/1.00/10.0/100)
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> HIGH SCALE ADJ. [100]%LEL </div>	<ul style="list-style-type: none"> ➤ This mode is to set high scale value which is displayed on full range. Whenever "↑" or "↓" switch is touched, the high scale value will be higher or lower. (1-10000)
<div style="border: 2px solid black; padding: 5px; width: fit-content;"> PASSWORD SET [00] </div>	<ul style="list-style-type: none"> ➤ This mode is to set password. The password will be checked when the user attempts to enter parameter program mode or maintenance mode. (0-99)

11.4. How to use Calibration Mode

The gas detector must be allowed to stabilize prior to use. It requires at least 30 minutes period after being powered up to reach stable condition due to its characteristics. However, management standards may be changeable according to onsite condition.

11.4.1. Zero Calibration and Span Calibration

<div style="border: 2px solid black; padding: 5px; text-align: center;"> CALIBRATION MODE </div>	<ul style="list-style-type: none"> ➤ After password has been confirmed, the detector will go into level1 mode. ➤ Select CALIBRATION mode by touching "↑" or "↓" switch. ➤ At this moment, if function key is touched, the detector will go into submenu of programmable mode level2.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> CALIBRATION [ZERO & SPAN] </div>	<ul style="list-style-type: none"> ➤ When [ZERO & SPAN] is displayed, if functinal key is touched, the detector will go into ZERO & SPAN Calibration mode.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ZERO CALIBRATION [YES] </div>	<ul style="list-style-type: none"> ➤ When [YES] is displayed by touching "↑" or "↓" switch, touch FUNC switch and then zero calibration will be performed.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ZERO GAS [0]%LEL </div>	<ul style="list-style-type: none"> ➤ For doing zero calibration, insert clean air or 100% nitrogen for one minute at the rate of 1000mL/min into sensors with using calibration tool. Once it has stabilized, zero calibration can be performed automatically by touching FUNC switch.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ZERO PROCESSING >>>> </div>	<ul style="list-style-type: none"> ➤ During performing zero calibration, the progress will be displayed.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ZERO PROCESSING SUCCESS </div>	<ul style="list-style-type: none"> ➤ If zero calibration is completed to be successful, a message "ZERO PROCESSING SUCCESS" will be displayed for two seconds and then the mode will transit to CALIBRATION DATA mode.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ZERO PROCESSING FAIL </div>	<ul style="list-style-type: none"> ➤ If it fails, "ZERO PROCESSING FAIL" will be displayed for two seconds and then the mode will change to CALIBRATION DATA mode.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> CALIBRATION DATA [WAIT]%LEL </div>	<ul style="list-style-type: none"> ➤ This mode is to display measured value after completing calibration. This mode also enables the user to check if the detector was calibrated properly or not.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> CALIBRATION DATA [0]%LEL </div>	<ul style="list-style-type: none"> ➤ If the detector enters submenu, it displays "WAIT" for two seconds and then indicates current measurement state. ➤ If RESET switch is touched, the detector will return back to "CALIBRATION MODE". ➤ If FUNC switch is touched, it will go into Span Calibration menu.

<div style="border: 2px solid black; padding: 5px; text-align: center;"> SPAN CALIBRATION [YES] </div>	<ul style="list-style-type: none"> ➤ When [YES] is shown by touching "↑" or "↓" switch, touching FUNC switch makes the detector's mode change to Span Calibration Mode.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> SPAN GAS VALUE [50] </div>	<ul style="list-style-type: none"> ➤ This mode enables the user to set standard gas value. The value can be adjusted by touching "↑" or "↓" switch. And then, the value will be set by touching "FUNC" switch. (1-Full scale)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> [CH4] SPAN GAS 090 [50]%LEL </div>	<ul style="list-style-type: none"> ➤ For doing span calibration, insert standard gas for about 90 seconds at the rate of 1000mL/min into sensors with calibration tool. Once it has stabilized, span calibration can be performed automatically by touching FUNC switch.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> SPAN PROCESSING >>>> </div>	<ul style="list-style-type: none"> ➤ During performing span calibration, the progress will be displayed.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> SPAN PROCESSING SUCCESS </div>	<ul style="list-style-type: none"> ➤ If span calibration is completed to be successful, a message "SPAN PROCESSING SUCCESS" will be displayed for two seconds and then the mode will transit to CALIBRATION DATA mode.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> SPAN PROCESSING FAIL </div>	<ul style="list-style-type: none"> ➤ If it fails, "SPAN PROCESSING FAIL" will be displayed for two seconds and then the mode will change to CALIBRATION DATA mode.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> CALIBRATION DATA [0]%LEL </div>	<ul style="list-style-type: none"> ➤ This mode is to display measured value after completing calibration. This mode also enables the user to check if the detector was calibrated properly. ➤ After the detector enters submenu, it displays "WAIT" for two seconds and then indicates current measurement state. ➤ If RESET or FUNC switch is touched, the detector will return back to CALIBRATION MODE.

11.5. How to set alarm in Alarm mode

<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM PROGRAM MODE </div>	<ul style="list-style-type: none"> ➤ After password has been confirmed, the detector goes into level1 mode. ➤ Select ALARM mode by touching "↑" or "↓" switch. ➤ At this moment, if function key is touched, the detector will go into submenu of ALARM MODE Level2.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM OPERATING [AUTO] </div> <div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM OPERATING [MANUAL] </div>	<ul style="list-style-type: none"> ➤ This mode is to configure reset type of alarm. By touching "↑" or "↓" switch, the type will be alternatively changed between "AUTO" and "MANUAL". ➤ In "AUTO" mode, alarm will be reset automatically. In "MANUAL" mode, alarm will be reset only when reset switch turns on.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM RELAY TYPE DE-ENERGIZED </div>	<ul style="list-style-type: none"> ➤ This mode is to configure Relay drive type of alarm. By touching "↑" or "↓" switch, the type will be alternatively changed between "DE-ENERGIZED" and "ENERGIZED". ➤ "DE-ENERGIZED" mode is inactive ENERGIZER function and "ENERGIZED" mode is active ENERGIZER function.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> FAULT RELAY TYPE DE-ENERGIZED </div>	<ul style="list-style-type: none"> ➤ This mode is to configure Relay drive type of FAULT. By touching "↑" or "↓" switch, the type will be alternatively changed between "DE-ENERGIZED" and "ENERGIZED". ➤ "DE-ENERGIZED" mode is inactive ENERGIZER function and "ENERGIZED" mode is active ENERGIZER function.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM1 TYPE SEL. [INCREASE] </div> <div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM1 TYPE SEL. [DECREASE] </div>	<ul style="list-style-type: none"> ➤ This mode is to set the operational direction for Alarm1. "INCREASE" or "DECREASE" will be displayed alternatively whenever "↑" or "↓" switch is touched. ➤ In "INCREASE" mode, alarm1 will be activated if the measured value is same or higher than preset value for Alarm1. In "DECREASE" mode, alarm1 will be activated if the measured value is same or lower than preset value for Alarm1.

<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM1 LEVEL ADJ [20] </div>	<ul style="list-style-type: none"> ➤ This mode is to set Alarm1 level. The level will increase or decrease whenever "↑" or "↓" switch is touched. ➤ When the desired value is shown, touch FUNC switch to set the value as Alarm1 value. After that, the detector will go to Alarm Program state.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM1 DEAD BAND [1.0]%FS </div>	<ul style="list-style-type: none"> ➤ This mode is to set the operational range of Alarm1. The value will increase or decrease whenever "↑" or "↓" switch is touched. ➤ In "INCREASE" mode, Alarm1 will be activated on the value of Alarm1 value + Dead band value and deactivated on the value of Alarm1 value – Dead band value. ➤ When the desired value is displayed, touch "FUNC" switch to set Dead band value. After that, the detector will go to Alarm program state.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM 1RELAY CTL [ON] </div>	<ul style="list-style-type: none"> ➤ This mode is to set ON or OFF for relay contact control on alarm1 by touching "↑" or "↓" switch. ➤ In case of ON, relay will operate when alarm1 is activated. In case of OFF, relay will not operate when alarm1 is activated.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM1 TIME SET [01] </div>	<ul style="list-style-type: none"> ➤ This mode is to set delay time of the alarm1. The value can be increased or decreased by touching "↑" or "↓" switch. ➤ The value shown in LCD(OLED) indicates seconds and its range is from 0 to 60. When the desired value is displayed, touch FUNC switch to set delay time of the alarm1. After that, the detector will go to Alarm Program state.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM2 TYPE SEL. [INCREASE] </div>	<ul style="list-style-type: none"> ➤ This mode is to set the operational direction for Alarm2. "INCREASE" or "DECREASE" will be displayed alternatively whenever "↑" or "↓" switch is touched.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM2 TYPE SEL. [DECREASE] </div>	<ul style="list-style-type: none"> ➤ In "INCREASE" mode, alarm will be activated if the measured value is same or higher than preset value for Alarm2. In "DECREASE" mode, alarm will be activated if the measured value is same or lower than preset value for Alarm2.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM2 LEVEL ADJ [40] </div>	<ul style="list-style-type: none"> ➤ This mode is to set Alarm2 level. The level will increase or decrease whenever "↑" or "↓" switch is touched. ➤ When the desired value is shown, touch FUNC switch to set the value as Alarm2 value. After that, the detector will go to Alarm Program state.

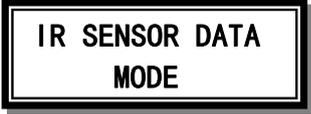
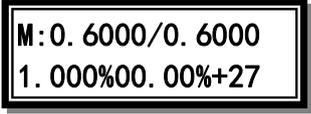
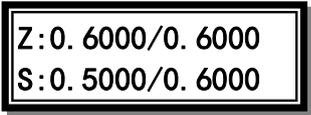
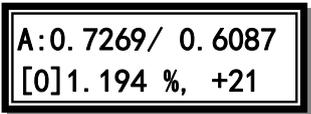
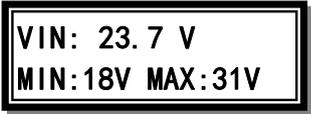
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM2 DEAD BAND [1.0]%FS </div>	<ul style="list-style-type: none"> ➤ This mode is to set the operational range of Alarm2. The value will increase or decrease whenever "↑" or "↓" switch is touched. ➤ In "INCREASE" mode, Alarm1 will be activated on the value of Alarm2 value + Dead band value and deactivated on the value of Alarm2 value – Dead band value. ➤ When the desired value is displayed, touch "FUNC" switch to set Dead band value. After that, the detector will go to Alarm program state.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM2 RELAY CTL [ON] </div>	<ul style="list-style-type: none"> ➤ This mode is to set ON or OFF for relay contact control on alarm2 by touching "↑" or "↓" switch. ➤ In case of ON, relay will operate when alarm2 is activated. In case of OFF, relay will not operate when alarm2 is activated.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM2 TIME SET [01] </div>	<ul style="list-style-type: none"> ➤ This mode is to set delay time of the alarm2. The value can be increased or decreased by touching "↑" or "↓" switch. ➤ The value shown in LCD(OLED) indicates seconds and its range is from 0 to 60. When the desired value is displayed, touch FUNC switch to set delay time of the alarm2. After that, the detector's mode will go back to ALARM PROGRAM MODE.

11.1. How to use Test Mode

<div style="border: 2px solid black; padding: 5px; text-align: center;"> TEST MODE </div>	<ul style="list-style-type: none"> ➤ After password has been confirmed, the detector goes into level1 mode. ➤ Select TEST mode by touching "↑" or "↓" switch. ➤ At this moment, if function key is touched, the detector will go into TEST MODE submenu.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> TROUBLE RELAY [OFF] </div>	<ul style="list-style-type: none"> ➤ This mode is to set "trouble relay test operation" to be ON or OFF. When "↑" or "↓" switch is touched, ON or OFF will be alternatively displayed.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ALARM RELAY [OFF] </div>	<ul style="list-style-type: none"> ➤ This mode is to set "alarm relay test operation" to be ON or OFF. When "↑" or "↓" switch is touched, ON or OFF will be alternatively displayed.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> OUTPUT SIGNAL [4mA] </div> <div style="border: 2px solid black; padding: 5px; text-align: center;"> OUTPUT SIGNAL [20mA] </div>	<ul style="list-style-type: none"> ➤ This mode is to set "output signal test operation" to be 4mA or 20mA. When "↑" or "↓" switch is touched, "4mA" or "20mA" will be alternatively displayed. ➤ When the desired value is shown, touch FUNC switch to set the value. After that, the detector's mode will transit to next test mode item. ➤ If the value has been set to be 4mA, the detector will output 4mA. If set to be 20mA, it will output 20mA.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> [TEST] [0]%LEL </div>	<ul style="list-style-type: none"> ➤ This mode enables the user to test trouble relay, alarm relay and output signal with the value being set. ➤ If 4mA has been set in output signal mode, the output will be 4mA and the value of %LEL shown in LCD(OLED) will be 0. And the value will be adjusted by touching "↑" or "↓" switch. On the contrary, if 20mA has been set, the output will be 20mA and the value of %LEL shown in LCD(OLED) will be 100.

11.2. How to use IR SENSOR DATA MODE

IR Sensor Data Mode is a mode to view current value and state of sensor. In this mode, value and state cannot be modified.

	<ul style="list-style-type: none"> ➤ After password has been confirmed, the detector goes into level 1 mode. ➤ Select IR SENSOR DATA mode by touching by touching "↑" or "↓" switch. ➤ At the moment, if function key is touched, the detector will go into IR SENSOR DATA MODE submenu.
	<ul style="list-style-type: none"> ➤ This mode allows the user to view current status of IR sensor. ➤ A message in the first line indicates the measured value of IR sensor in voltage. ➤ A message in the second line is displayed as following order. <ol style="list-style-type: none"> ① IR Sensor detector value in voltage / reference value in voltage (ideal value is 1.00%) ② Variation rate compared to ZERO (ideal value is 0.00%) ③ Measured temperature(80°C ~ -40°C)
	<ul style="list-style-type: none"> ➤ In this mode, the screen displays Detector value and Reference value of sensor in voltage. Those values have been generated following a manual calibration(ZERO or SPAN). ➤ In order to go into next mode, touch FUNC switch.
	<ul style="list-style-type: none"> ➤ This mode is to display temperature and ratio of detector and reference. (Zero Det/Ref & Span Det/Ref) Those values are generated following Zero or Span calibration manually.
	<ul style="list-style-type: none"> ➤ This mode is to display temperature compensation activation mode and IR sensor data which has been set after the device is ZERO calibrated in automatic mode. It also displays IR sensor data voltage rate and temperature in case of auto zero calibration.
	<ul style="list-style-type: none"> ➤ In this mode, voltage of power supplied to circuit from external power source is displayed. ➤ Touch RESET or FUNC switch, then the detector's mode will return back to IR SENSOR DATA MODE.

11.3. How to use VERSION MODE

<div style="border: 2px solid black; padding: 5px; text-align: center;"> VERSION MODE </div>	<ul style="list-style-type: none"> ➤ After password has been confirmed, the detector goes into level1 mode. ➤ Select VERSION mode by touching "↑" or "↓" switch. ➤ At this moment, if function key is touched, the detector will go into IR SENSOR DATA MODE submenu.
<div style="border: 2px solid black; padding: 5px;"> >GIR3000A:V007 >GSA920A :V1.20 </div>	<ul style="list-style-type: none"> ➤ In this screen, program version of the product is shown. ➤ A message shown in the first row indicates program version of GIR3000A. ➤ A message shown in the second row indicates program version of GSA920A.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> H/W VERSION [REV 2] </div>	<ul style="list-style-type: none"> ➤ It is H/W version.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> HART DEVICE [REV 1] </div>	<ul style="list-style-type: none"> ➤ It is HART device version which has been configured.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> HART REV [REV 7] </div>	<ul style="list-style-type: none"> ➤ It is HART protocol version which has been configured. ➤ Touch "FUNC" switch, then the detector's mode will return back to VERSION MODE.

11.4. How to set Maintenance Mode

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

<div style="border: 2px solid black; padding: 5px; text-align: center;"> MAINTENANCE MODE </div>	<ul style="list-style-type: none"> ➤ After password has been confirmed, the detector goes into level1 mode. ➤ Select MAINTENANCE mode by touching "↑" or "↓" switch. ➤ At this moment, if function key is touched, the detector will go into submenu of MAINTENANCE MODE.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> CROSS SENS. TYPE [X.X] </div>	<ul style="list-style-type: none"> ➤ This mode is to set decimal point of sensor's cross sensitivity. (Default value is X.X)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> CROSS SENS. ADJ. [1.0] X GAS </div>	<ul style="list-style-type: none"> ➤ This mode is to set cross sensitivity(0.1~5.0) of sensor. This value can be adjusted by touching "↑" or "↓" switch. The value will increase or decrease by 0.1. (Default value is 1.0)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> SET-UP MODE [OFF] </div>	<ul style="list-style-type: none"> ➤ When ON is set, "SET-UP" will be displayed in the part where measured value is supposed to be shown and measured value of gas will be changed to 0%. (4mA output, MODBUS output 0) When OFF is set, this function will not be available. (Default setting is OFF)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ZERO SKIP BAND [ON] </div>	<ul style="list-style-type: none"> ➤ This mode is to set zero sensitivity of sensor. ➤ The value will be alternatively switched between ON and OFF by touching "↑" or "↓" switch. In case of setting to be ON, the value measured by sensor will be determined as following way. The value will be set to be 0 if the measured value is in 0-2% range of high scale value. The value will be deducted by 2% if measured value is in 2-3.3%. The value will be set to be same as measured value if the measured value is in 3.3%-100%. (Default setting is ON)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ZERO SKIP [0.0]%FRNG </div>	<ul style="list-style-type: none"> ➤ This mode is to set zero sensitivity of sensor. ➤ The value will increase or decrease by 0.1 when "↑" or "↓" switch is touched. ➤ If the measured value is same or lower than preset value, it will be set to be 0. The value can be adjusted in the range up to 10% of high scale value. ➤ Touch FUNC switch, then the detector's mode will go to next mode.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> OPER. DELAY TIME [0]SEC </div>	<ul style="list-style-type: none"> ➤ This mode is to set delay time of determining value being measured. (default value is 0)

<div style="border: 2px solid black; padding: 5px; text-align: center;"> TEMP COMPENSATI. [ON] </div>	<ul style="list-style-type: none"> ➤ This mode enables the user to set the temperature compensating functionality of sensor. ➤ Touch "↑" or "↓" switch, then the mode will be alternatively switched between ON and OFF. ➤ In case of setting to be ON, the temperature compensation function will operate. (Default value is ON)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> AUTO ZERO MODE [ON] </div>	<ul style="list-style-type: none"> ➤ This mode enables the user to set AUTO ZERO functionality of Sensor. ➤ Touch "↑" or "↓" switch, then the mode will be alternatively switched between ON and OFF. In case of setting to be ON, AUTO ZERO function will operate. (Default value is ON)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> BASE ZERO MODE [ON] </div>	<ul style="list-style-type: none"> ➤ This mode is to set BASE ZERO of Sensor. ➤ Touch "↑" or "↓" switch, then the mode will be alternatively switched between ON and OFF. In case of setting to be ON, BASE ZERO function will operate. (Default value is ON)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> REF COMPENSATI. [ON] </div>	<ul style="list-style-type: none"> ➤ This mode to set Reference compensation function. ➤ Touch "↑" or "↓" switch, then the mode will be alternatively switched between ON and OFF. In case of setting to be ON, Reference compensation function will operate. (Default value is ON)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> FLT8 PROTECTION [OFF] </div>	<ul style="list-style-type: none"> ➤ Touch "↑" or "↓" switch, then the mode will be alternatively switched between ON and OFF. In case of setting to be ON, the detector will ignore FAULT8 error. In case of OFF, the detector will apply FAULT8 error. (Default value is OFF)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> UNDER CHECK [OFF] </div>	<ul style="list-style-type: none"> ➤ This mode is to set UNDER displaying functionality which shows a message "UNDER" if %LEL value falls under -10%. ➤ Touch "↑" or "↓" switch, then the mode will be alternatively switched between ON and OFF. In case of setting to be ON, the function will operate. (Default value is OFF)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> W-LIGHT MODE [STEADY] </div>	<ul style="list-style-type: none"> ➤ This mode to set LED operation in Normal state. ➤ In case of setting to be "STEADY", green LED will turn on. In case of "BLINKING", green LED will be blinking. (Default setting is STEADY)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> MAINTANCE -LEVEL [0] </div>	<ul style="list-style-type: none"> ➤ This mode is to set current output value in maintenance mode. (Default value is 0)

<div style="border: 2px solid black; padding: 5px; text-align: center;"> ENGINEERING MODE [OFF] </div>	<ul style="list-style-type: none"> ➤ This mode is to set functionality of displaying equipment's temperature and –LEL value. ➤ Touch "↑" or "↓" switch, then the mode will be alternatively switched between ON and OFF. In case of setting to be ON, the function to display equipment's temperature and –LEL value will operate. (Default value is OFF)
<div style="border: 2px solid black; padding: 5px; text-align: center;"> EMERGE. TIME OUT [OFF] </div>	<ul style="list-style-type: none"> ➤ This mode is to set time duration of maintenance mode. In case of setting to be ON, maintenance mode will be allowed to operate only for 30 minutes. In case of OFF, there will be no time limit to operate maintenance mode. (Default value is OFF)

11.1. How to configure 485 MODBUS

<div style="border: 2px solid black; padding: 5px; text-align: center;"> 485 BOARD [CHECK] </div>	<ul style="list-style-type: none"> ➤ This mode is to check the connection status of 485 board. If the board is connected, "CHECK" will be shown. Otherwise, "EMPTY" will be shown.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> ADDRESS NO. [01] </div>	<ul style="list-style-type: none"> ➤ This mode is to set a detector's address for RS-485 communication. Whenever "↑" or "↓" switch is touched, address number will increase or decrease. (Available address is between 1 and 64. An address assigned to detector must be unique. And it needs to be set only when RS-485 communication is used.) When desired address number is shown, touch FUNC switch to set the value as an address for detector. And then, the detector's mode will return back to 485 MODBUS mode. (Default value is 1)

11.2. How to configure in Device Mode

※  The operations in this chapter must not be allowed by general users.

<div style="border: 2px solid black; padding: 5px; text-align: center;"> DEVICE MODE </div>	<ul style="list-style-type: none"> ➤ After password has been confirmed, the detector goes into level1 mode. ➤ Select DEVICE mode by touching "↑" or "↓" switch. ➤ At the moment, if function key is touched, the detector will go into submenu of DEVICE MODE.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> HART BOARD [CHECK] </div>	<ul style="list-style-type: none"> ➤ This mode is to check the connection status of HART board. If the board is connected, "CHECK" will be shown. Otherwise "EMPTY" will be shown.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> P-ADDR LOOP CUR [0] [ON] </div>	<ul style="list-style-type: none"> ➤ This mode is to set polling address of HART device. ➤ The available value is between 0 and 63. (Default value is 0) ➤ If polling address is not 0, the setting of current output mode is fixed to be 4mA.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> FIXED CUR. MODE [DISABLE] </div>	<ul style="list-style-type: none"> ➤ This mode is to check fixed current mode of HART device. ➤ This value cannot be modified.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> DEVICE CODE [0xE1C6] </div>	<ul style="list-style-type: none"> ➤ This mode is to check Device Code of HART device. ➤ This value cannot be modified.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> SERIAL NUMBER [0000000] </div>	<ul style="list-style-type: none"> ➤ This mode is to check Serial Number of HART device. ➤ This value cannot be modified.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> TAG [GIR-0001] </div>	<ul style="list-style-type: none"> ➤ This mode is to check Tag of HART device. ➤ This value cannot be modified.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> LONG TAG [GIR-0001 -LT > </div>	<ul style="list-style-type: none"> ➤ This mode is to check long tag of HART device. ➤ Long string can be shifted by touching "↑" or "↓" switch. ➤ This string cannot be modified.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> DESCRIPTION [GASTRON GIR300> </div>	<ul style="list-style-type: none"> ➤ This mode is to check descriptor of HART device. ➤ This value cannot be modified.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> MESSAGE [IR GAS DETECTO> </div>	<ul style="list-style-type: none"> ➤ This mode is to check messages generated by HART device. ➤ The messages cannot be modified.
<div style="border: 2px solid black; padding: 5px; text-align: center;"> FINAL ASSEMB. NUM [0] </div>	<ul style="list-style-type: none"> ➤ This mode is to set Final Assembly number of HART device. ➤ Available number is 0-100. (Default value is 0)

11.3. How to use INSPECTION MODE

This Mode is used for the inspector to identify the detector status and Fault details without affecting the equipment operated in emergency. Only authorized personnel are allowed to use this Mode.

[CH4] < 0] %LEL

- Press and hold the "↓" Switch for at least 3 seconds while Means value display gas concentrations in the display. Press and hold the "↓" Switch for at least 3 seconds to exit again.
- Entering Inspection Mode, '<' mark will flash at the first place in the second row.
- You can enter M.-LEVEL item from Maintenance Mode to set Output value.

11.4. Data initialization

Only authorized personnel are allowed to conduct this Mode because it will initialize all the values to the data set in the factory before shipping.

TSM, SEN INIT [YES]

- Turn the power ON while holding "FUNC" Key and "UP" Key.
- When " TSM,SEN INIT " is displayed on the Display window, select "YES" to carry out the data initialization.

11.5. Correction data initialization

Only authorized personnel is allowed to conduct the initialization because this Mode initializes to the value of Calibration data set in the factory before shipping. This Mode is used for the inspector to initialize only the Calibration value among setting values.

SEN CAL INIT [YES]

- Turn the power ON while holding "FUNC" Key and "UP" Key.
- When " SEN CAL INIT " is displayed on the Display window, select "YES" to carry out the normal initialization of Calibration data.

12. Troubleshooting

Fault code / Output Message	Description & Condition	Recovery
FAULT0 "TSM-MEM C/S"	Internal Memory(FLASH, RAM) Check sum Error of GIR3000A Transmitter	Fault in Transmitter PCB MPU (U1)
FAULT1 "TSM-EEPROM"	EEPROM Check sum Error or EEPROM Operation Error of GIR3000A Transmitter	Fault in Transmitter PCB EEPROM (U4)
FAULT2 "SEN-MEM C/S"	Internal Memory(FLASH, RAM) Check sum Error of GSA920A Sensor	Fault in sensing part (GSA-920A)
FAULT3 "SEN-EEPROM"	EEPROM Checksum Error or EEPROM operation Error of GSA920A Sensor	Fault in sensing part (GSA-920A)
FAULT4 "SEN-COM T/O"	Lost communication between GIR3000A Transmitter and GSA920A	Connection fault in CN6 sensor terminal, or fault in sensing part(GSA-920A)
FAULT5 "SEN-CHANGE(DET)"	Output generated by GSA920A's internal IR Detector channel falls below a valid voltage level(0.1V)	Check filter and waveguide of sensing part (GSA-920A) Fault in gas sensor
FAULT6 "SEN-CHANGE(REF)"	Output generated by GSA920A's internal IR Reference channel falls below a valid voltage level(0.1V)	Check filter and waveguide of sensing part (GSA-920A) Fault in gas sensor
FAULT7 "SEN-CHANGE(OPT)"	Both outputs of IR Detector channel and reference channel fall below a valid voltage level(0.1V)	Check filter and waveguide of sensing part (GSA-920A) Fault in gas sensor
FAULT8	Calibration Error	Recalibration is required
FAULT9 "SEN-D,RCH LOW"	Both outputs of IR Detector Channel and Reference Channel fall below fault voltage level(0.03V)	Check filter and waveguide of sensing part (GSA-920A) Fault in gas sensor
FAULT10 ">SEN-EMPERATURE"	Temperature measured by IR's internal temperature sensor is out of valid range (+75~ - 40'C)	Check ambient temperature, fault in temperature sensor
FAULT11 ">SEN-VERSION"	The version number of GSA920A Sensor sent by GIR3000A Transmitter is out of valid range (0-99)	Program error of sensing part(GSA-920A)
FAULT12 ">VIN LOW VOLTAGE"	Voltage level of GSA920A Sensor input is below minimum level(17V)	Check input power (Normal voltage level is 24V)
FAULT13 > HW VERSION ERR	HW VERSION ERROR	Check voltage distribution resistance of ADC inlets

13. Caution before installation

13.1. Selection of installation location (Occupational Safety and Health Law)

The Gas leak detection alarm system shall be installed in such place as follows. :

- 1) Near chemical accessory equipment installed inside/outside of a building and susceptible of gas leak such as compressors, valves, reactors, and piping connections, etc. dealing with combustible and toxic materials.
- 2) Locations risky of remaining gas near manufacturing equipments with ignition source like heaters.
- 3) Around connections of filling equipments of combustible and toxic substances.
- 4) Substations, distribution panel rooms, control rooms, etc. near explosion-proof area.
- 5) Other special gas-friendly places.

13.2. Selection of installation location (High Pressure Gas Safety Management Regulations)

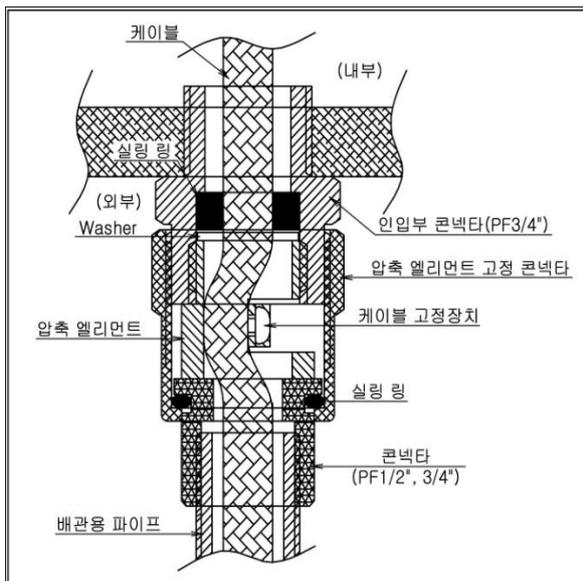
The Gas detector of the Gas leak detection alarm system shall be installed close to risky area of gas leakage. However, if the direct gas leaks are not expected, but gas residence is vulnerable, it should be installed in such places as follows.

- 1) A gas leak detection alarm outside of a building shall be installed in a risky place of gas residence considering the wind direction, wind speed, and the gravity of the gas.
- 2) A gas leak detection alarm inside of a building shall be installed in the lower part of the building if the gas is lighter than the air, and upper part or near the vent of the building.
- 3) The alarm of the Gas leak detection alarm system shall be installed near Gas detector or in places where workers usually are.

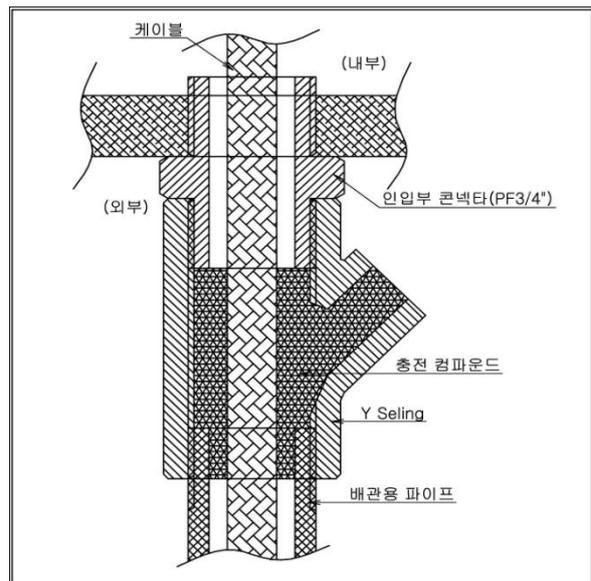
13.3. Precaution before installation

Rainwater shall be avoided because it can be an electrical hindrance, and accessibility should be considered for periodic maintenance before installation. Vibration or shock shall be avoided since it may affect the output value, and the sensor shall face the direction of gravity when installed.

- This device has high pressure explosion-proof structure; belongs to GROUP II targeting gas and steam from general workplaces and chemical plants; and can be used in hazardous places of ZONE 1 (ONE) –class 1 and ZONE 2 (TWO) –class 2.
- Allowable temperature belongs to 85 °C or lower, which corresponds to T6.
- The ambient temperature shall be in the range of -20 °C ~ 60 °C.
- Installation elevation: less than 1,000 M above sea level
- Relative Humidity: 5-99%
- Installation place: indoors or outdoors
- Explosive ignition temperature of the gases or vapors used: Ex d IIC T6
- The wire conduit shall be sealed to prevent the gas moving or the explosion flame propagation through the conduit under 45cm when the explosion-proof cable gland is used at the cable inlet or when metal conduit is used in wiring works.
- At least 5 screw threads must be used for connection of this device and the conduit.
- Other standards should be met in this work such as: [Standards on the selection, installation and maintenance of wiring for workplace explosion-proof structural electrical mechanism.
- **Only qualified materials shall be used in cable entry including CABLE GLAND and SEALING FITTING; and used in the closure of unused incoming part.**



[Figure 14. Pressure packing type]



[Figure 15. Y Sealing Compound]

14. Revision history

Version	Contents	Date
1.0	* Initial publication of manual	June 27 , 2011
1.1	* Updated the CO measurement range(10% -> 1.0%)	July 13, 2011
1.2	* Modified Calibration Mode and IR Sensor Data Mode	July 25, 2011
1.3	* Added new functionality related to HART	APR 3 , 2012
2	* Added mechanical drawing, operating flow and new function	AUG 21 , 2012
END		

This product and instruction manual are subject to change without prior notice for the improvement of product performance and ease of use.



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