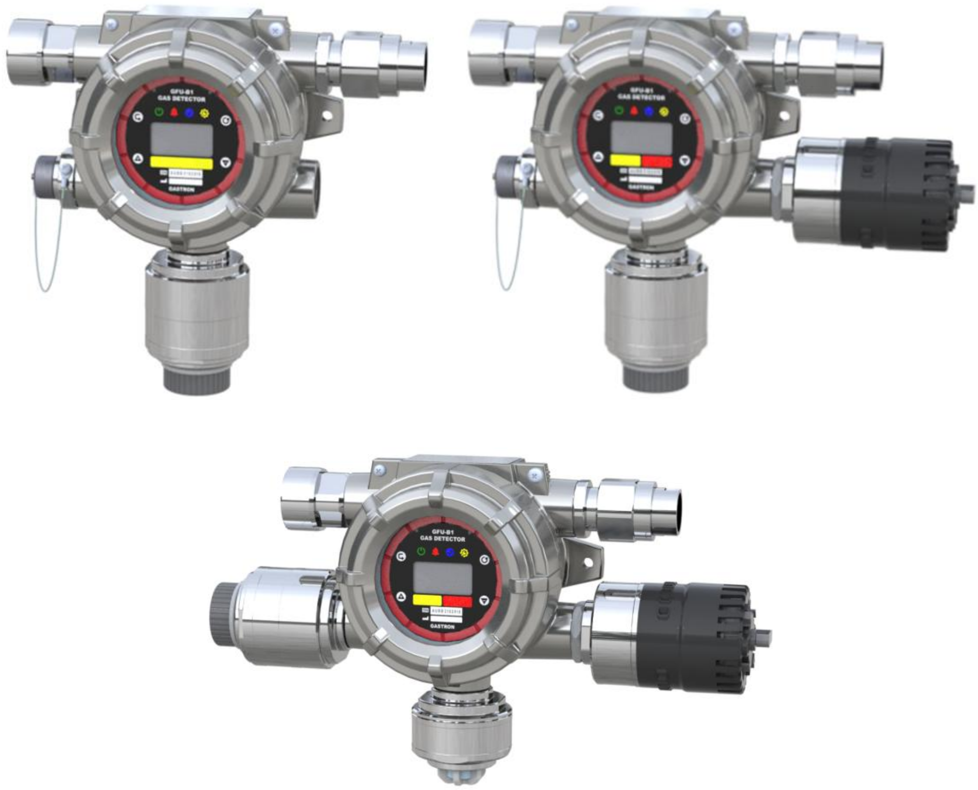
Design, Development, Production, Installation and Added Service of Gas Detector

GASTRON

DOC NO. Ex-GR15023091201E

Universal Gas Detector
GFU-B1
Instruction Manual

Revision: 0.3



Please read carefully for right use.

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 the gas detector. It also briefly explains how to repair and maintain the device. Please keep this manual in safe place after reading carefully. This instruction manual will be of great help when you encounter any trouble or question while you are using the device.

If you have any problem when using our product, contact us to following address:

- Address: 23, Gunpocheomdansaneop 1-ro, Gunpo-si, Gyeonggi-do, 15581, Rep of Korea
- Tel : 031-490-0800
- Fax : 031-490-0801
- URL : www.gastron.com
- E-mail : gastron@gastron.com

Note

- **We recommend that the gas detector should be inspected and calibrated with calibration gas prior to use for accurate operation.**
- **Without getting calibrated, the device might be malfunctioned due to sensor aging problem.**
- **When it is necessary to disassemble the device, technician with special skills for a gas detector must perform it.**
- **For more details about maintenance and calibration of gas detector, contact our technical department via email or visiting our web site.**

⚠ WARNING

1) **Read and understand this manual carefully before installing, operating, or maintaining the Universal Gas Detector GFU-B1.**
2) **The device will perform as designed only if it is used, installed, and maintained in accordance with the manufacturer's instructions. Otherwise, it could fail to perform as designed and persons who rely on this device for their safety could sustain serious personal injury or in the worst case scenario, loss of life.**
3) **Any work on the interior of the detector must be conducted only by trained and competent personnel.**
4) **Never open the cover while power is on, unless the area is known to be non-hazardous where explosive atmospheres must not be present.**
5) **Installation must be in accordance with the recognized standards of the appropriate authority in the country concerned.**
6) **Before carrying out any work ensure local regulations and site procedures are followed. Appropriate standards must be followed to maintain the overall certification of the Universal Gas Detector GFU-B1.**
7) **Do not disconnect the protective earthing/grounding wire or terminal.**
8) **Before operating the product, check the protective functions for defects. Do not operate the product if you suspect any problems with the protective earthing/grounding or other protective functions.**
9) **Connect to a protective earth/ground before connecting to external control circuits.**
10) **When connecting HART Handheld Devices to HART PORT, intrinsic safety explosion-proof certification must be considered. The HART Handheld Device must be selected considering the intrinsically safe explosion-proof entity parameters, and when connecting, the capacitance and inductance must be taken into account not only the values of the HART Handheld Device but also the values of the connection cable.**

Max. 31 Vdc and 500 mA - Electrical Parameters for Intrinsic Safety · Input (supplied from unspecified safe area equipment): U_m = 250 V · HART port (connected to external intrinsically safe equipment) U_o = 23.63 V, I_o = 133 mA, P_o = 784 mW, C_o = 0.128 μF, L_o = 2 mH U_i = 21.85 V, I_i = 120 mA, P_i = 1.0 W, C_i = 0 uF, L_i = 0 mH The above values of Co and Lo are allowed for; - distributed capacitance and inductance e.g. as in a cable, or - if the total Li of the external circuit (excluding the cable) is < 1% of the Lo value, or - if the total Ci of the external circuit (excluding the cable) is < 1% of the Co value. The above values of Co and Lo are reduced to 50% if both of the following conditions are met; - the total Li of the external circuit (excluding the cable) is ≥ 1% of the Lo value and - the total Ci of the external circuit (excluding the cable) is ≥ 1% of the Co value. The reduced capacitance of the external circuit (including cable) shall not be greater than 1 μF for Group IIA and IIB and 600 nF for Group

IIC. The values of Co and Lo shall not be exceeded by the sum of all of the Li plus cable inductances in the circuit and the sum of all of the Ci plus cable capacitances respectively.

CAUTION

1) **When opening the cover, use a portable gas detector or other similar device to confirm that there is no gas present in the vicinity.**
2) **Using in a stable temperature environment is recommended.**
3) **The product is a safety device. Be sure to maintain the product at regular intervals to ensure safety. Continuing to use the product without adequate maintenance will result in sensor sensitivity degradation and prevent proper gas detection.**

※ All of the warnings and cautions shown above may be repeated in the appropriate sections of the manual.

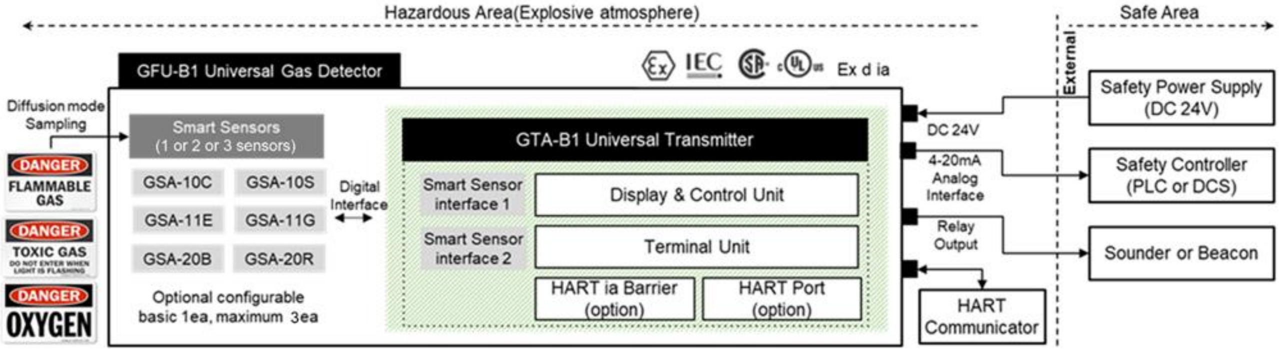
TABLE OF CONTENTS

1. Overview

Universal Gas Detector GFU-B1 is a fixed gas detector with explosion-proof structure to continuously measure combustible gases, toxic gases, and oxygen in various industrial areas. GFU-B1 can be used in explosion-hazardous areas such as Zone 1 and Division 1 by applying explosion-proof, dust ignition proof, and intrinsically safe explosion-proof structures.

2. Structure

The product consists of three types of smart sensor modules (GSA-10, 11, 20) in charge of gas measurement and a universal transmitter (GTA-B1) that displays the measured gas to the field user and transmits it to the control unit in the safe area.



[Figure 1. GFU-B1 Overview]

Smart sensor modules are composed of three types of sensor modules as follows.

- GSA-10C, GSA-10S composed of catalytic bead sensor for measuring combustible gas series with flameproof type structure
- GSA-20R, GSA-20B with NDIR optical structure to measure combustible gas series with flameproof type structure
- GSA-11E, GSA-11G composed of an electrochemical sensor for measuring toxic gases and oxygen concentration in a complex explosion-proof structure.

All of these smart sensor modules are supplied with DC power from the transmitter in a stainless steel enclosure and process gas measurement values and control signals with digital interface.

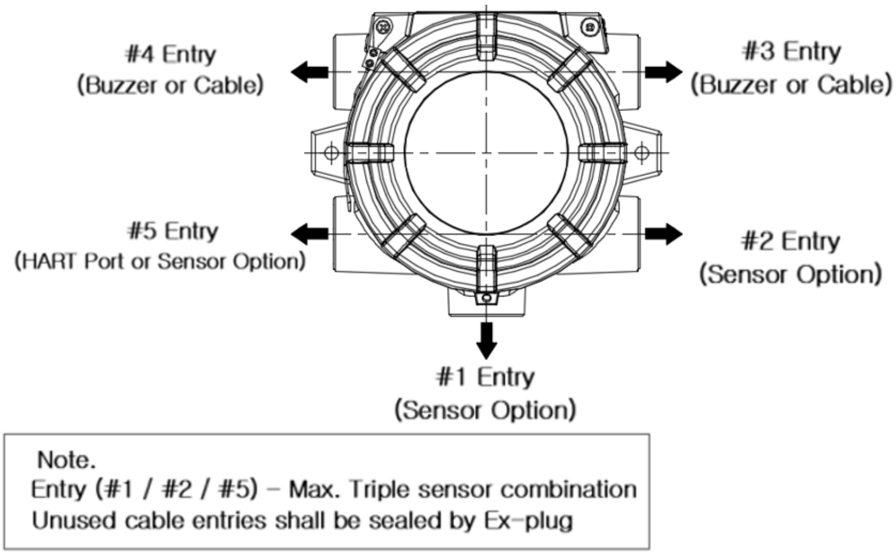
The universal transmitter module GTA-B1 is equipped with a smart sensor module that measures the gas value, displays the final processed gas concentration to the field user through graphic OLED and status LED, and transmits it to the control unit through a 4-20mA analog current signal. GTA-B1 operates through DC 24V power supplied from outside, and up to three smart sensors can be installed.

In addition, product status can be transmitted as digital data through various optional configurations such as HART (including HART port through intrinsic safety barrier), RS485, Relay, and Bluetooth. Based on the aluminum (or stainless steel) enclosure of flameproof structure, it has a measured value display structure through tempered glass, and has a total of 5 cable entries for various options, up to 3 smart sensors, and cable configuration.

Various gases can be measured through the combination of GTA-B1 and GSA Series smart sensors, and depending on the detecting method, it can be configured as diffusion, flow method type, or insert type, and has a remote installation option that can extend the smart sensor module up to 100meters.

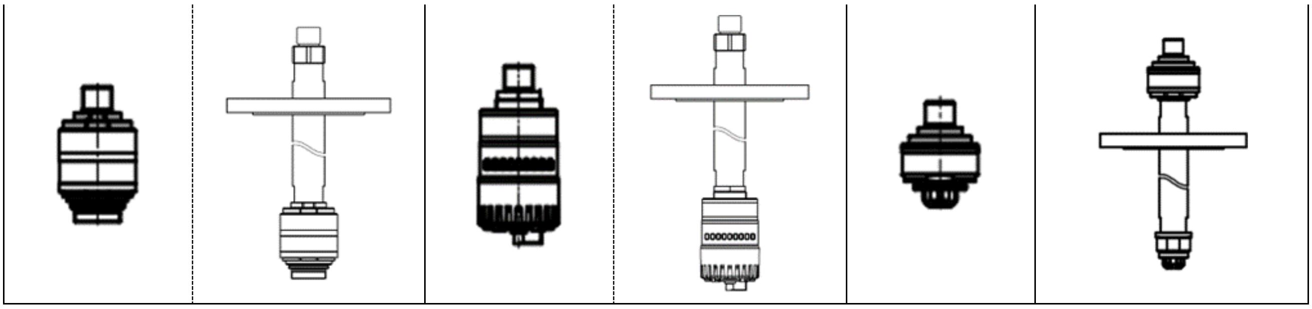
3. Universal Gas Detector, GFU-B1 Configuration

GTA-B1 Transmitter

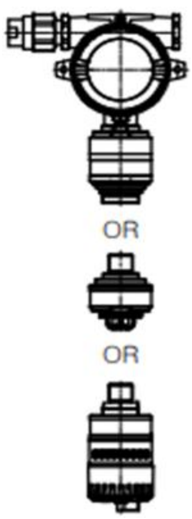
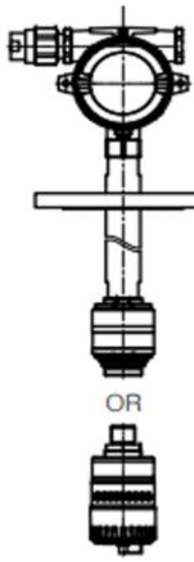
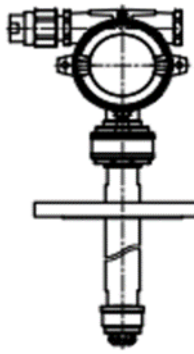


[Figure 2 - GTA-B1 Entry Configuration]

GSA Sensor option Series (For "Integrated" Installation option)					
GSA-11E/G		GSA-20B/R		GSA-10C	GSA-10S
"Diffusion" or "Flow" Detecting method type option	"Pipe flange(Diffusion)" Detecting method type option	"Diffusion" or "Flow" Detecting method type option	"Pipe flange(Diffusion)" Detecting method type option	"Diffusion" or "Flow" Detecting method type option	"Pipe flange(Diffusion)" Detecting method type option

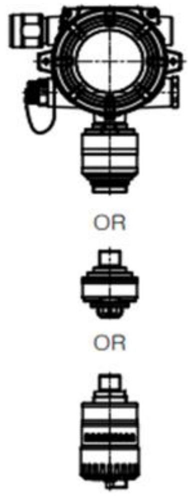


[Figure 3 - Integrated GSA Sensor Series Configuration]

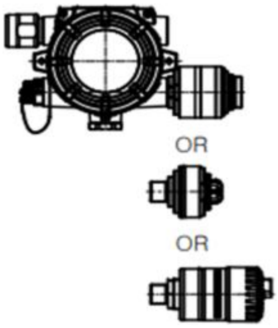
GSA Sensor option Series (For "Remote(Junction Box)", GSA-JB1 Installation option)		
"Diffusion" or "Flow" Detecting method type option	"Pipe flange(Diffusion)" Detecting method type option	
GSA-11E/G or GSA-10C or GSA-20B/R	GSA-11E/G or GSA-20B/R	GSA-10S
		

[Figure 4 - Remote Junction Box GSA-JB1, GSA Sensor Series Configuration]

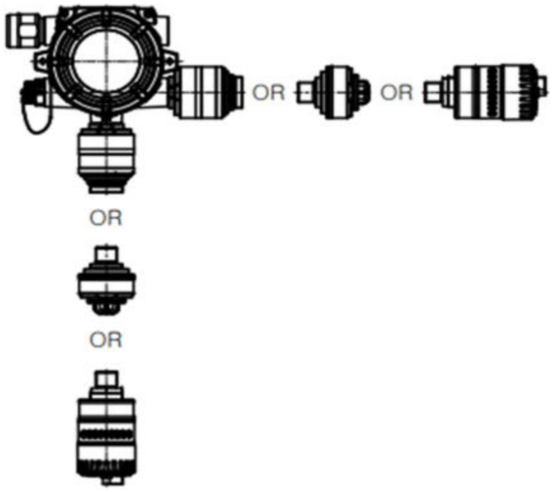
GFU-B1 Configurations



(Single, #1 Entry)
GTA-B1 +
“Diffusion” or “Flow”
Detecting method type option
GSA-11E/G or
GSA-10C or
GSA-20B/R



(Single, #2 Entry)
GTA-B1 +
“Diffusion” or “Flow”
Detecting method type option
GSA-11E/G or
GSA-10C or
GSA-20B/R

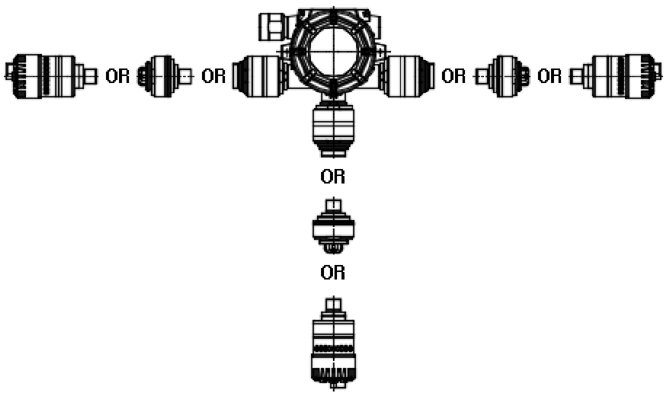


(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry)
“Diffusion” or “Flow”
Detecting method type option
GSA-11E/G or
GSA-10C or
GSA-20B/R

+

(#2 Entry)
“Diffusion” or “Flow”
Detecting method type option
GSA-11E/G or
GSA-10C or
GSA-20B/R



(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +

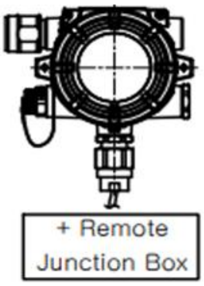
(#1/#2/#5 Entry)
“Diffusion” or “Flow”
Detecting method type option
GSA-11E/G

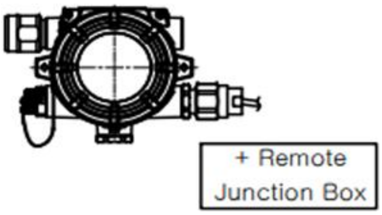
+

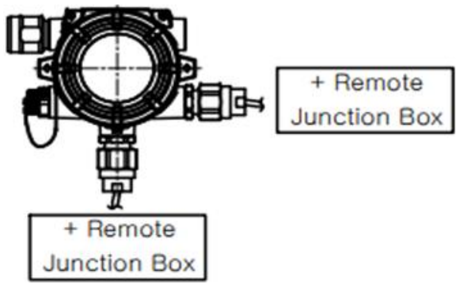
(#1/#2/#5 Entry)
“Diffusion” or “Flow”
Detecting method type option
GSA-11E/G or
GSA-10C or

+

(#1/#2/#5 Entry)
“Diffusion” or “Flow”
Detecting method type option
GSA-11E/G or
GSA-10C or

<table>
<tr><td></td><td>GSA-20B/R</td><td>GSA-20B/R</td></tr>
<tr>
<td>

(Single, #1 Entry)
GTA-B1 +
Remote Junction Box
(GSA Sensor)</td>
<td>

(Single, #2 Entry)
GTA-B1 +
Remote Junction Box
(GSA Sensor)</td>
<td>

(Dual, #1 Entry + #2 Entry)
GTA-B1 +
(#1 Entry)
Remote Junction Box (GSA Sensor)
+
(#2 Entry)
Remote Junction Box (GSA Sensor)</td>
</tr>
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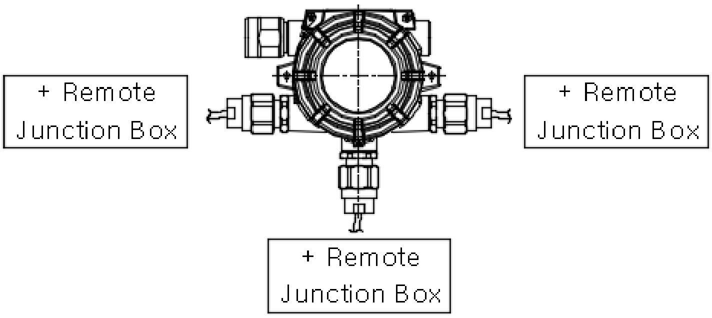
<td colspan="3">

(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +
(#1/#2/#5 Entry)
Remote Junction Box (GSA-11E/G)
+
(#1/#2/#5 Entry)
Remote Junction Box
(GSA Sensor)
+
(#1/#2/#5 Entry)
Remote Junction Box
(GSA Sensor)</td>
</tr>
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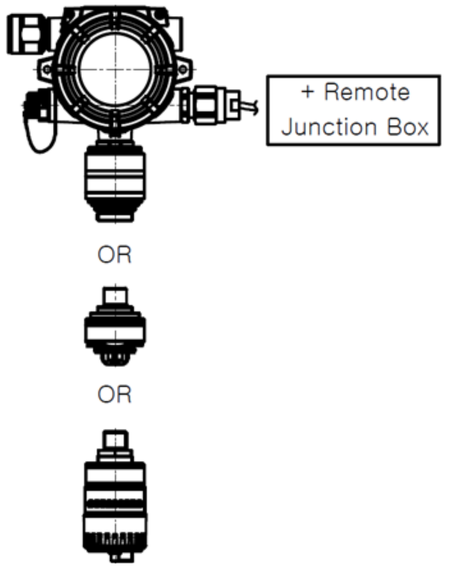
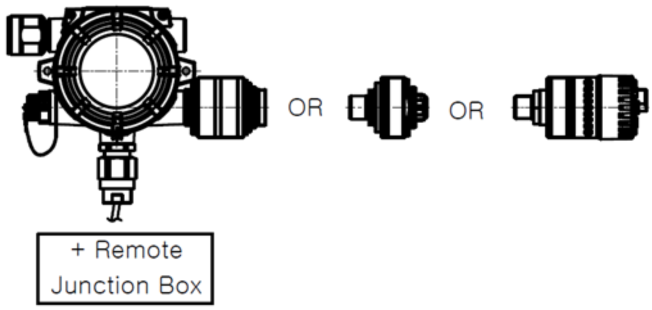


(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry)
"Diffusion" or "Flow"
Detecting method
type option
GSA-11E/G or
GSA-10C or
GSA-20B/R

\+

(#2 Entry)
Remote
Junction Box
(GSA Sensor)

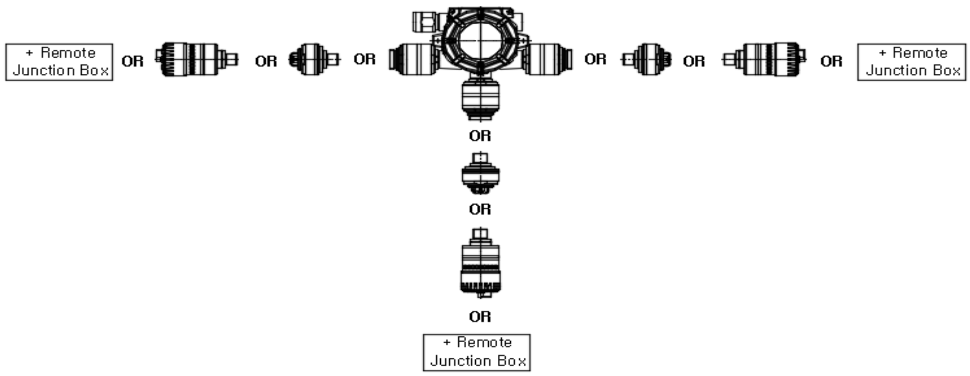


(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry)
Remote Junction
Box (GSA Sensor)

\+

(#2 Entry)
"Diffusion" or "Flow"
Detecting method type
option
GSA-11E/G or
GSA-10C or
GSA-20B/R



(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +

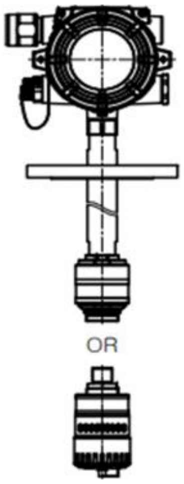
(#1/#2/#5 Entry)
"Diffusion" or "Flow"
Detecting method type
option
GSA-11E/G or
Remote Junction Box
(GSA-11E/G)

\+

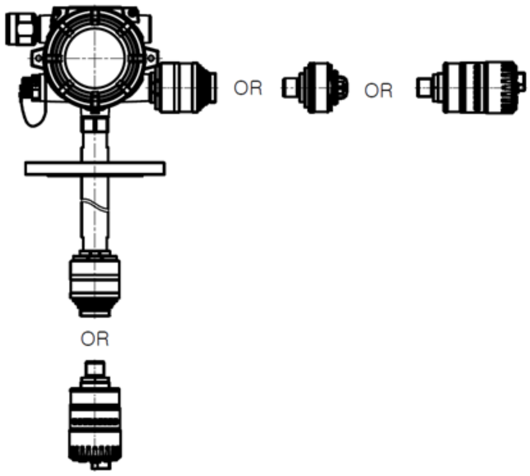
(#1/#2/#5 Entry)
"Diffusion" or "Flow"
Detecting method type option
GSA-11E/G or
GSA-10C or
GSA-20B/R or
Remote Junction Box
(GSA Sensor)

\+

(#1/#2/#5 Entry)
"Diffusion" or "Flow"
Detecting method type option
GSA-11E/G or
GSA-10C or
GSA-20B/R or
Remote Junction Box
(GSA Sensor)



(Single, #1 Entry)
GTA-B1 +
"Pipe flange(Diffusion)" Detecting method type option
GSA-11E/G or GSA-20B/R

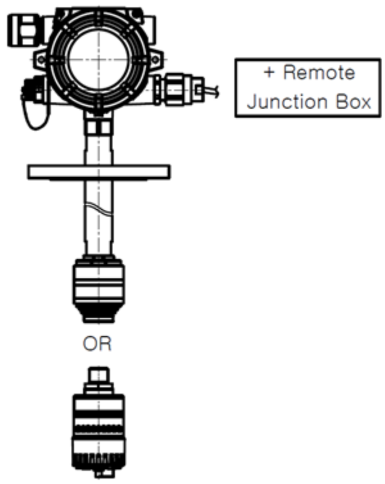


(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry)
"Pipe flange(Diffusion)" Detecting method type option
GSA-11E/G or GSA-20B/R

\+

(#2 Entry)
"Diffusion" or "Flow" Detecting method type option
GSA-11E/G or GSA-10C or GSA-20B/R

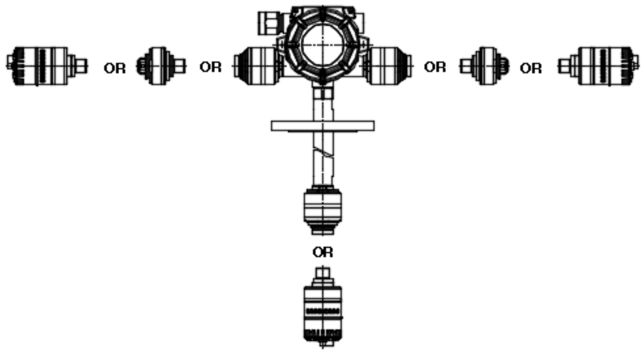


(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry)
"Pipe flange(Diffusion)" Detecting method type option
GSA-11E/G or GSA-20B/R

\+

(#2 Entry)
Remote Junction Box (GSA Sensor)



(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +

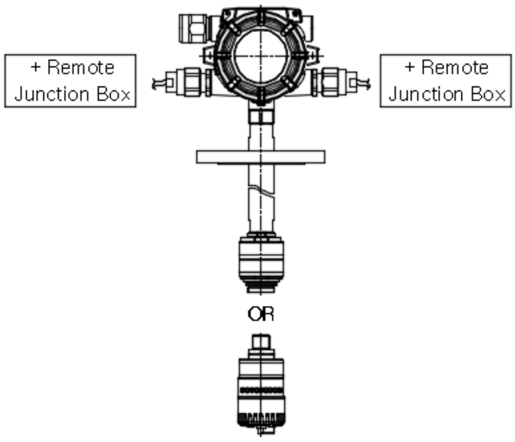
(#2 / #5 Entry)
"Diffusion" or "Flow"
Detecting method type option
GSA-11E/G

\+

(#1 Entry)
"Pipe flange(Diffusion)"
Detecting method type option
GSA-11E/G or GSA-20B/R

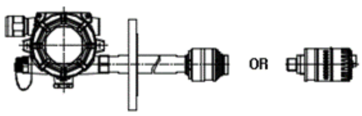
\+

(#2 / #5 Entry)
"Diffusion" or "Flow"
Detecting method type option
GSA-11E/G or GSA-10C or GSA-20B/R

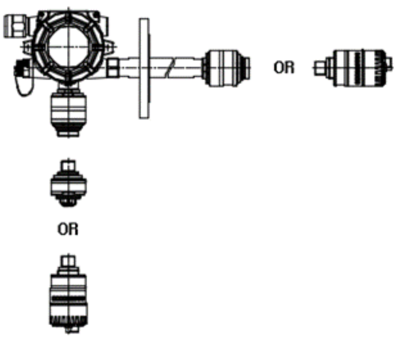


(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +

(#2 / #5 Entry) **Remote Junction Box** **(GSA-11E/G)**	+	(#1 Entry) "Pipe flange(Diffusion)" Detecting method type option **GSA-11E/G or** **GSA-20B/R**	+	(#2 / #5 Entry) **Remote Junction Box** **(GSA Sensor)**

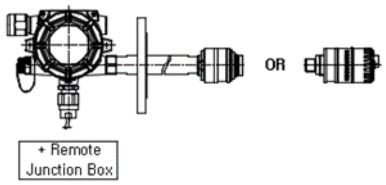


(Single, #2 Entry)
GTA-B1 +
"Pipe flange(Diffusion)"
Detecting method type option
GSA-11E/G or
GSA-20B/R



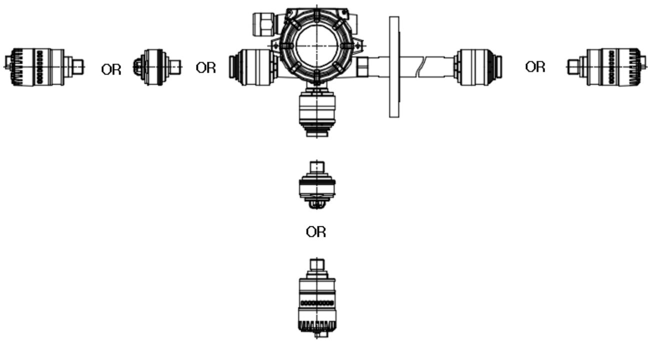
(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry) "Diffusion" or "Flow" Detecting method type option **GSA-11E/G or** **GSA-10C or** **GSA-20B/R**	+	(#2 Entry) "Pipe flange (Diffusion)" Detecting method type option **GSA-11E/G** **or** **GSA-20B/R**



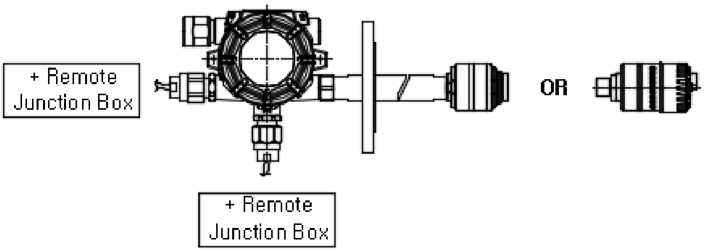
(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry) **Remote Junction Box** **(GSA Sensor)**	+	(#2 Entry) "Pipe flange (Diffusion)" Detecting method type option **GSA-11E/G** **or** **GSA-20B/R**



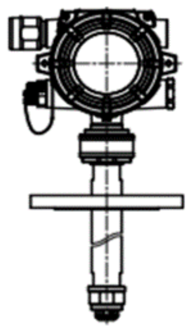
(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +

(#1 / #5 Entry)		(#1 / #5 Entry)		(#2 Entry)
"Diffusion" or "Flow" Detecting method type option **GSA-11E/G**	**+**	"Diffusion" or "Flow" Detecting method type option **GSA-11E/G or GSA-10C or GSA-20B/R**	**+**	"Pipe flange (Diffusion)" Detecting method type option **GSA-11E/G or GSA-20B/R**

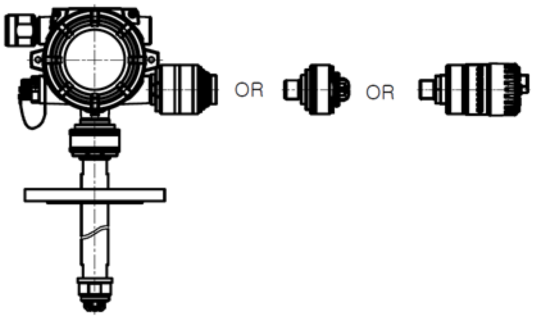


(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +

(#1 / #5 Entry)		(#1 / #5 Entry)		(#2 Entry)
Remote Junction Box (GSA-11E/G)	**+**	**Remote Junction Box (GSA Sensor)**	**+**	"Pipe flange (Diffusion)" Detecting method type option **GSA-11E/G or GSA-20B/R**



(Single, #1 Entry)
GTA-B1 +
"Pipe flange(Diffusion)"
Detecting method type option
GSA-10S

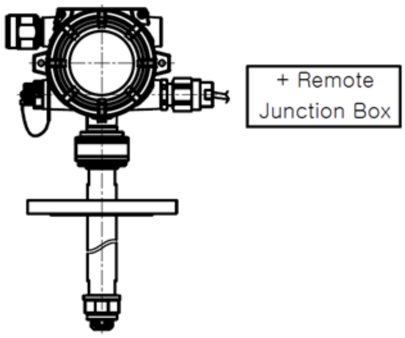


(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry)
"Pipe flange(Diffusion)"
Detecting method type option
GSA-10S

+

(#2 Entry)
"Diffusion" or "Flow"
Detecting method type option
GSA-11E/G or GSA-10C or GSA-20B/R

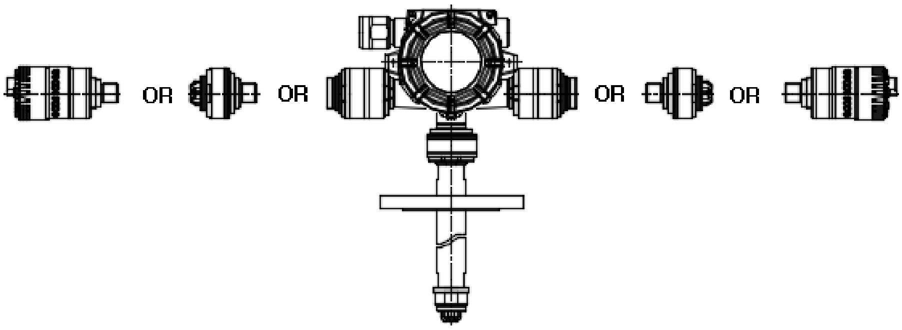


(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry)
"Pipe flange (Diffusion)"
Detecting method type option
GSA-10S

+

(#2 Entry)
Remote Junction Box (GSA Sensor)



(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +

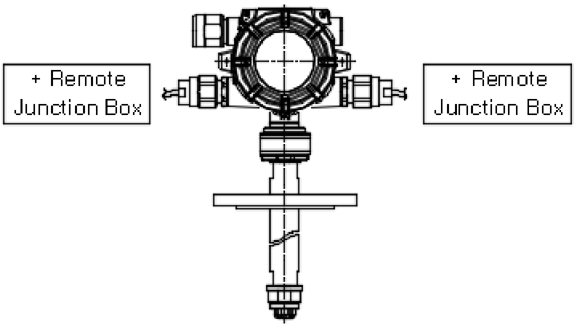
(#2 / #5 Entry)
"Diffusion" or "Flow"
Detecting method type option
GSA-11E/G

+

(#1 Entry)
"Pipe flange(Diffusion)"
Detecting method type option
GSA-10S

+

(#2 / #5 Entry)
"Diffusion" or "Flow"
Detecting method type option
GSA-11E/G or GSA-10C or GSA-20B/R

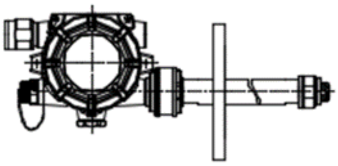


(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +

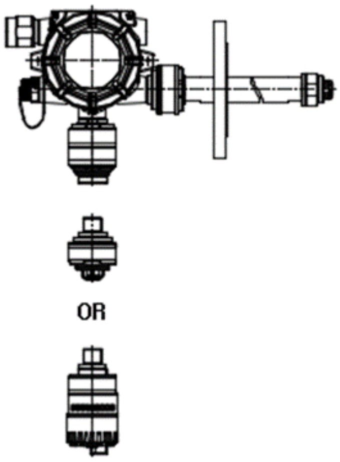
(#2 / #5 Entry)
Remote Junction Box
(GSA-11E/G)

(#1 Entry)
"Pipe flange(Diffusion)"
Detecting method type
option
GSA-10S

(#2 / #5 Entry)
Remote Junction Box
(GSA Sensor)



(Single, #2 Entry)
GTA-B1 +
“Pipe flange(Diffusion)”
Detecting method type option
GSA-10S

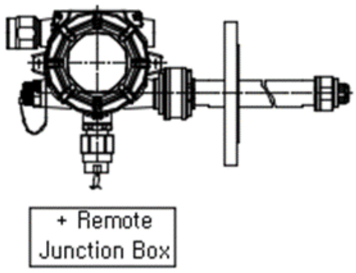


(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry)
“Diffusion” or “Flow”
Detecting method type option
GSA-11E/G or
GSA-10C or
GSA-20B/R

\+

(#2 Entry)
“Pipe flange (Diffusion)”
Detecting method type option
GSA-10S

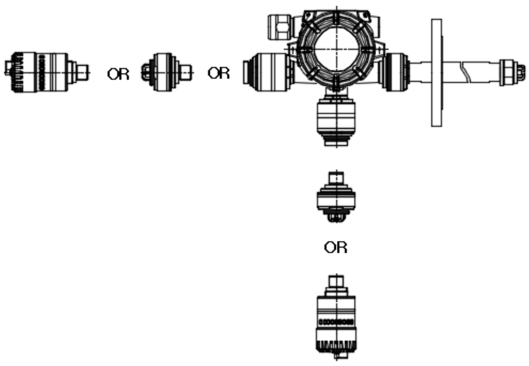


(Dual, #1 Entry + #2 Entry)
GTA-B1 +

(#1 Entry)
Remote Junction Box GSA Sensor

\+

(#2 Entry)
“Pipe flange (Diffusion)”
Detecting method type option
GSA-10S



(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +

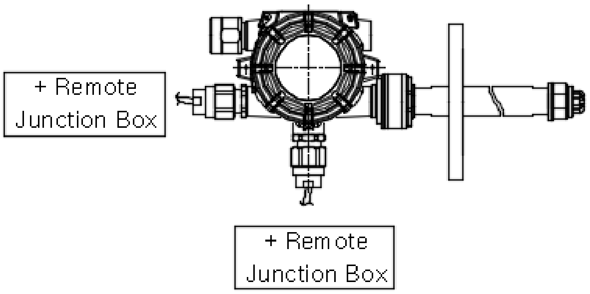
(#1 / #5 Entry)
“Diffusion” or “Flow”
Detecting method type option
GSA-11E/G

\+

GSA-10S
(#1 / #5 Entry)
“Diffusion” or “Flow”
Detecting method type option
GSA-11E/G or
GSA-10C or
GSA-20B/R

\+

(#2 Entry)
“Pipe flange (Diffusion)”
Detecting method type option
GSA-10S



(Triple, #1 Entry + #2 Entry + #5 Entry)
GTA-B1 +

(#1 / #5 Entry) **Remote Junction Box** **(GSA-11E/G)**	+	(#1 / #5 Entry) **Remote Junction Box** **(GSA Sensor)**	+	(#2 Entry) "Pipe flange (Diffusion)" Detecting method type option **GSA-10S**

[Figure 5 - GFU-B1 Configurations]

4. Specification

4.1. General Specifications

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 OLED Display	
Measuring Method (Depends on smart sensor)	GSA-10C or S	Catalytic Type
	GSA-11E or G	Electro-Chemical Type
	GSA-20R or B	NDIR(Non-Dispersive Infrared) Type
Detectable Gas	GSA-10C or S	Flammable gases
	GSA-11E	Toxic gases
	GSA-11G	O_2
	GSA-20R or B	Flammable gases, CO, CO_2
Accuracy	≤ ±3%FS	
Zero Drift	≤ 2%FS	
Response Time	Depends on smart sensor	
Ex Protection Type	Ex db ia [ia Ga] IIC T6,T5,T4 Gb Ex db IIC T6,T5,T4 Gb Ex tb IIIC T80℃/ T90℃/ T100℃ Db -40 ℃ ≤Ta ≤**60 ℃ : T6** / T 80 ℃ -40 ℃ ≤Ta ≤70 ℃ : T5 / T 90 ℃ -40 ℃ ≤Ta ≤80 ℃ : T4 / T 100 ℃	**When applying GSA-11 sensor** Ex db ia [ia Ga] IIC T6,T5,T4 Gb Ex db ia IIC T6,T5,T4 Gb Ex tb IIIC T80℃/ T90℃/ T100℃ Db -40 ℃ ≤Ta ≤**40 ℃ : T6** -40 ℃ ≤Ta ≤**60 ℃ : T 80 ℃** -40 ℃ ≤Ta ≤70 ℃ : T5 / T 90 ℃ -40 ℃ ≤Ta ≤**75 ℃ : T 100 ℃** -40 ℃ ≤Ta ≤80 ℃ : T4
IP	IP 66[1)]	
Basic Interface	Analog 4-20mA current interface	
HART Interface	HART REV7 (Option)	
Transmitter Option	HART	
	RS485	
	GTL-150 Buzzer	
	Sun Shield	
Sensor Option	Up to 3 smart sensors can be installed	
	Remote Type (Max. Distance : 100m)	
	Insert Type	
	Flow Adapter, Dust Cap/Filter, Sun Shield	
Warranty	Transmitter	2Year
	Smart Sensor	1Year

*1) 'GSA-11E/G' sensor : 'IP 66', installed with an accessory (splash guard or dust cap)
'GSA-20R/B' sensor : 'IP 66', basically
'GSA-10C' sensor : 'IP 66', installed at vertical direcion with a splash guard accessory (horizontal : 'IP 64')
'GSA-10S' sensor : 'IP 64', instralled with a splash guard accessory, at only vertical direcion available

4.2. Mechanical Specifications

I T E M S	S P E C I F I C A T I O N	
Explosion proof type	explosion-proof enclosure (Transmitter, GTA-B1)	
Dimension	GTA-B1	148 (W) × 147 (H) × 114(110) (D) mm
	GSA-JB1	110 (W) × 126 (H) × 95 (D) mm
	GSA-10C	65 (W) x 65 (H) x 63 (D) mm
	GSA-10S	65 (W) x Specify Length
	GSA-11E or G	65 (W) x 65 (H) x 87 (D) mm
	GSA-20R or B	69 (W) x 69 (H) x 122 (D) mm
Weight including Sensor	GTA-B1	≤ 1.9 Kg (AL) / ≤ 3.5 Kg (STS)
	GSA-10C	≤ 0.7 Kg
	GSA-11E or G	≤ 1.0 Kg
	GSA-20R or B	≤ 1.0 Kg
Mounting type	Wall mount	
Mounting holes	Ø 7 ± 0.1	
Cable inlet	M20 x 1.5P (standard, or M25 or NPT 1/2" or 3/4") or PF1/2"(KCs only) or PF3/4" (KCs only)	
Enclosure material	Transmitter	Aluminum Alloy
	Smart Sensor	Stainless Steel (STS316)

4.3. Electrical Specifications (Standard Type)

I T E M S	S P E C I F I C A T I O N	
Input Voltage (Standard)	Absolute min: Nominal: Absolute max: Ripple maximum allowed:	18 V 24 V 31 V 1 V pk-pk
	※ Customer supplied PSU must meet requirements IEC 1010-1 and CE Marking requirements.	
Wattage (Max. current/watt)	GTA-B1	6.24 W / 260 mA @+24 VDC
	GSA-10C or S	2.64 W / 110 mA @+24 VDC
	GSA-11E	0.29 W / 12 mA @+24 VDC
	GSA-11G	0.27 W / 11 mA @+24 VDC
	GSA-20R or B	4.08 W / 170 mA @+24 VDC

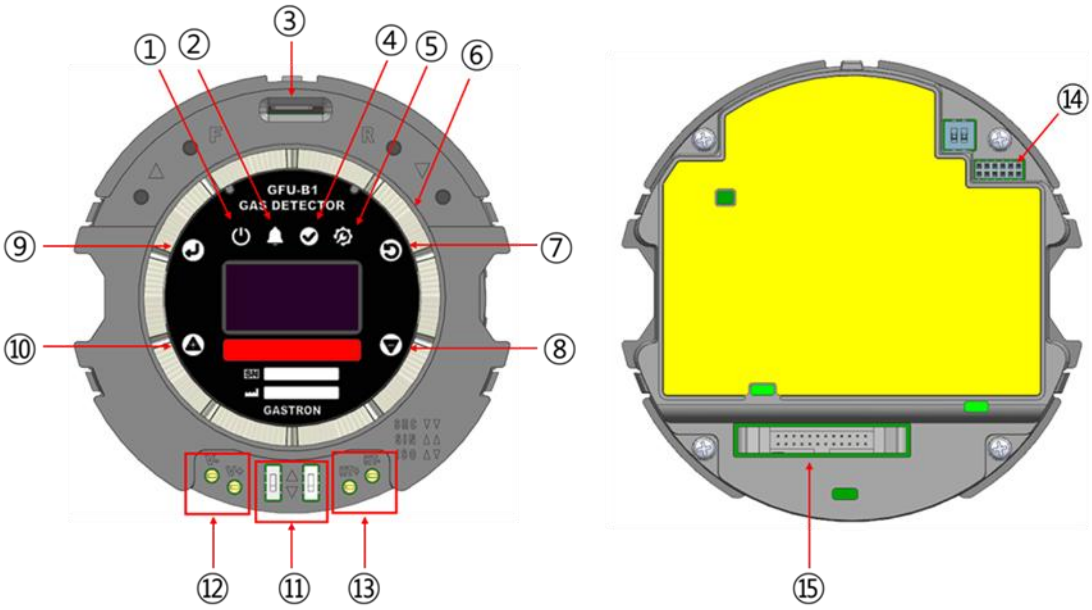
Analog output Current	0 - 20 mA (500 ohms max load) All readings ± 0.2 mA Measured-value signal : 4 mA(Zero) to 20 mA(Full Scale)	
	Fault :	0 mA / 2.5 mA (HART)
	0 - 100 %FS :	4 mA - 20 mA
	100 - 109 %FS :	20.0 mA - 21.44 mA
	Over 110 %FS :	21.6 mA
	Maintenance :	3 mA
Analog output current ripple & noise max	±20uA	
Relay contact	Alarm1, Alarm2, Fault Relay Rated 6 A @ 30VDC or 6 A @ 250 VAC	
Wiring requirement	Power	CVVS or CVVSB with shield
	Analog	CVVS or CVVSB with shield
	RS485	STP(Shielded Twisted Pair)
Cable Connection Length	Analog	2500m
	RS485	1000m
EMC Protection:	Complies with EN50270	

4.4. Environmental Specifications

I T E M S	S P E C I F I C A T I O N	
Operating Temperature	Transmitter	-40 to 80 ℃ (It may vary depending on Sensor type or Installation type.)
	Sensor	Sensor dependent, Refer to the sensor module datasheet or contact GASTRON for specific sensor data
Storage Temperature	Transmitter	-40 to 80 ℃ (It may vary depending on Sensor type or Installation type.)
	Sensor	Sensor dependent, Refer to the sensor module datasheet or contact GASTRON for specific sensor data
Operating Humidity	Transmitter	5 to 99% RH (Non-condensing, It may vary depending on Sensor type or Installation type.)
	Sensor	Sensor dependent, Refer to the sensor module datasheet or contact GASTRON for specific sensor data
Pressure Range	90 to 110KPa	
Max. air velocity	6m/s	

5. Names and functions for each part

5.1. GFU-B1 Display Part Components



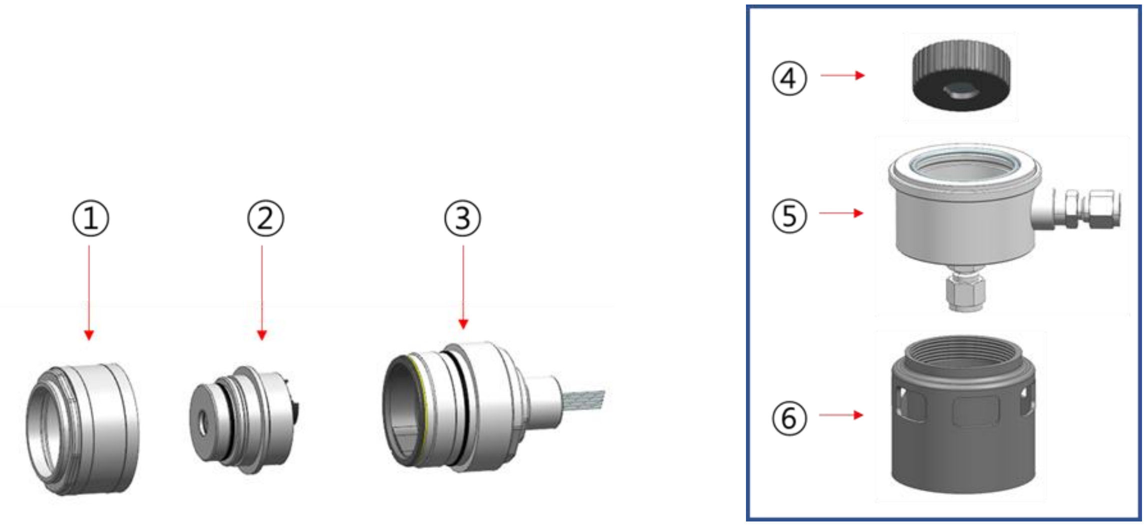
[Figure 6. GTA-B1 Display Part]

No	Name	Descriptions
1	Power lamp	Lamp turns on when switching on power.
2	Alarm lamp	Lamp flashes when Alarm1 or/and Alarm2 level is represented due to gas leakage.
3	SD Card Socket	The firmware of transmitter and sensors can be upgraded using an SD card.
4	State lamp	The green lamp lights up during normal operation, the red lamp flickers when any abnormality in circuit or sensing function is occurred.
5	Maintenance lamp	Lamp turns on when in maintenance mode.
6	Light Ring lamp	Lamp flashes when Alarm1 or/and Alarm2 level is represented due to gas leakage.
7	Reset key	Magnetic contact button used to cancel a key during parameter setting or to make it return to the previous state, its conversion is made through touch of 1 time by using magnet bar. (At every one touch, this key is converted to its previous mode by one step.)
8	▼(Down) key	Mode conversion or numerical change is made one step at a time with one touch using the magnetic bar. (Converted to lower level)
9	Function key	Magnetic contact button used to convert to configuration mode by touch for more than two seconds using magnet bar or, used to input or enter a selected setting value or menu by one touch using magnet bar.

10	▲(Up) key	Mode conversion or numerical change is made one step at a time with one touch using the magnetic bar. (Converted to upper level)
11	4-20mA mode selection switch	This switch selects a 4-20mA driving mode (source, sink, or isolation).
12	DC24V Test Point	This is a test point that can check the voltage DC24V input to the transmitter.
13	HART Test Point	This is a test point that can check the HART communication.
14	Program Connector	This is a connector used to update the product program.
15	Terminal I/F Connector	This is an interface connector for the terminal connection.

[Table 1. GTA-B1 Display Part Components description]

5.2. Sensor Part (GSA-11E, GSA-11G)

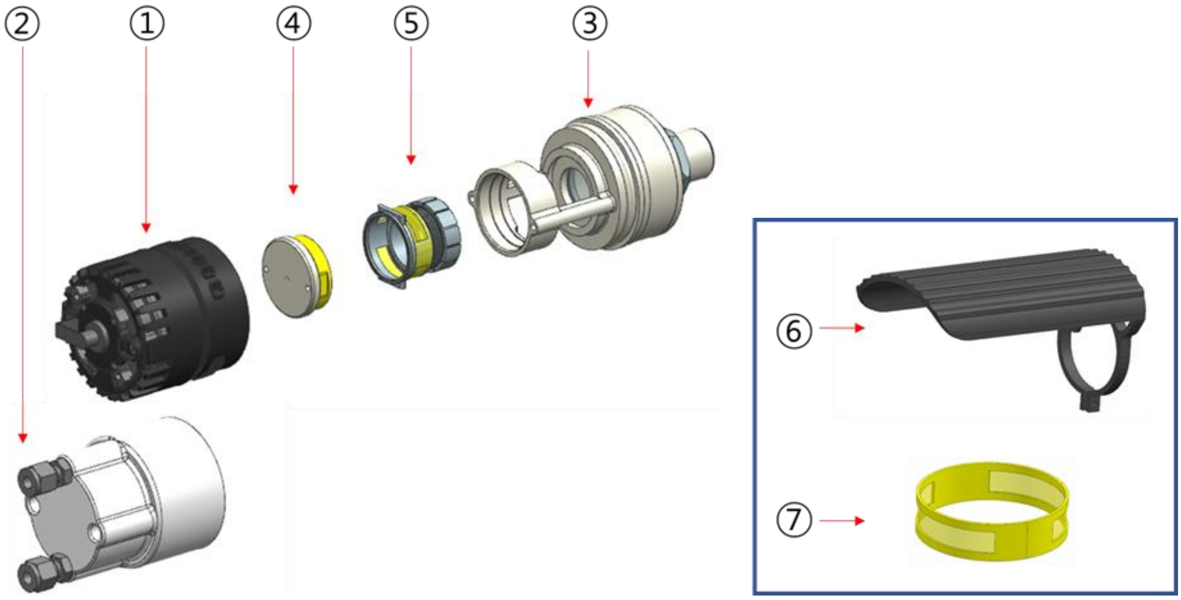


[Figure 7. GSA-11 Components]

No	Name	Descriptions
1	Coupling Cap	Sensor Cartridge Retention Cover
2	Sensor Cartridge	Electrochemical Toxic Sensor Cartridge for 'GSA-11E' or Electrochemical Oxygen Sensor Cartridge for 'GSA-11G'
3	Sensor Body	Supporter for the Sensor Cartridge
4	Dust Cap	Optional Accessory used to prevent dust penetration
5	Flow Adapter	Optional Accessory used for flow method type
6	Splash Guard	Accessory installed by default and used to protect from splashes penetration of rain or water

[Table 2. Sensor Part (GSA-11E, GSA-11G) Components description]

5.3. Sensor Part (GSA-20R, GSA-20B)

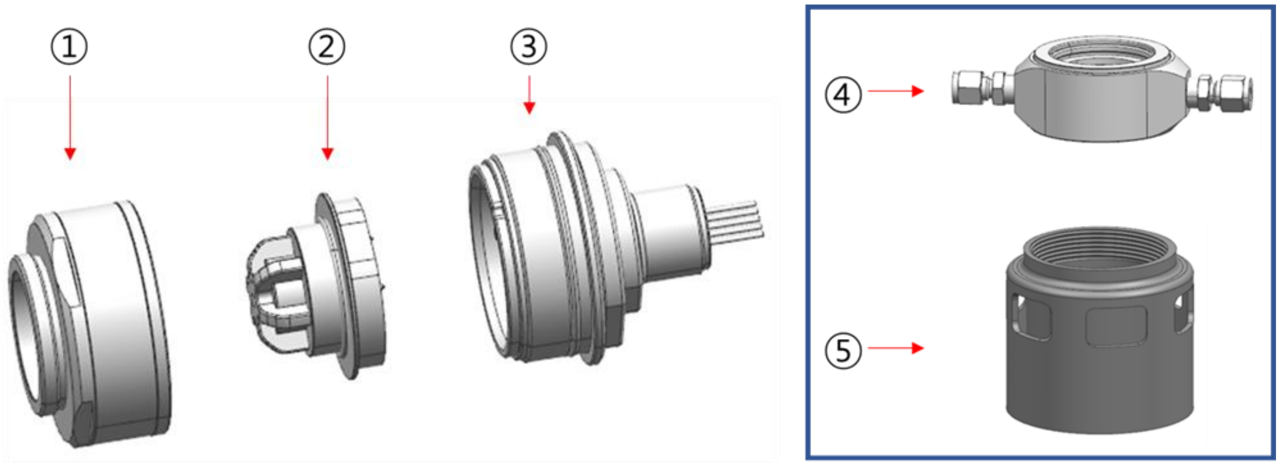


[Figure 8. GSA-20R, GSA-20B Components]

No	Name	Descriptions
1	Diffusion Cover	Optical Parts Protector Cover, For the diffusion detecting method type
2	Flow Cover	Optical Parts Protector Cover, For the flow method type
3	Sensor Body	Supporter for the Optical Reflector and the Cover
4	Optical Reflector	Source energy Reflector sent to sensor
5	Dust cap	Default-mounted protector for possible dust prevention function when the optional Dust Mesh Filter is attached.
6	Sun Shield	Optional Accessory used to protect from sun and rain
7	Dust Mesh Filter	Optional Accessory used to prevent dust penetration

[Table 3. Sensor Part (GSA-20R,GSA-20B) Components description]

5.4. Sensor Part (GSA-10C)

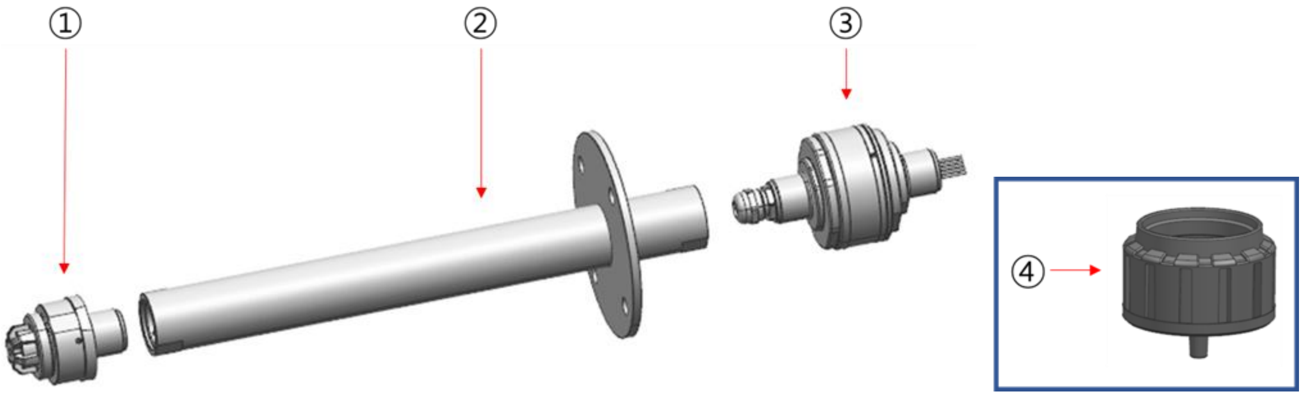


[Figure 9. GSA-10C Components]

No	Name	Descriptions
1	Coupling Cap	Sensor Cartridge Retention Cover
2	Sensor Cartridge	Catalytic combustion Sensor Cartridge
3	Sensor Body	Supporter for the Sensor Cartridge
4	Flow Adapter	Optional Accessory used for flow method type
5	Splash Guard	Accessory installed basically and used to protect from splashes penetration of rain or water

[Table 4. Sensor Part (GSA-10C) Components description]

5.5. Sensor Part (GSA-10S)



[Figure 10. GSA-10S Components]

No	Name	Descriptions
1	GSA-870Ex	Sensor Module
2	Pipe flange	Cable protector
3	Sensor Body	Supporter for the Pipe flange
4	Splash Guard	Optional Accessory used to protect from splashes penetration of rain or water

[Table 5. Sensor Part (GSA-10S) Components description]

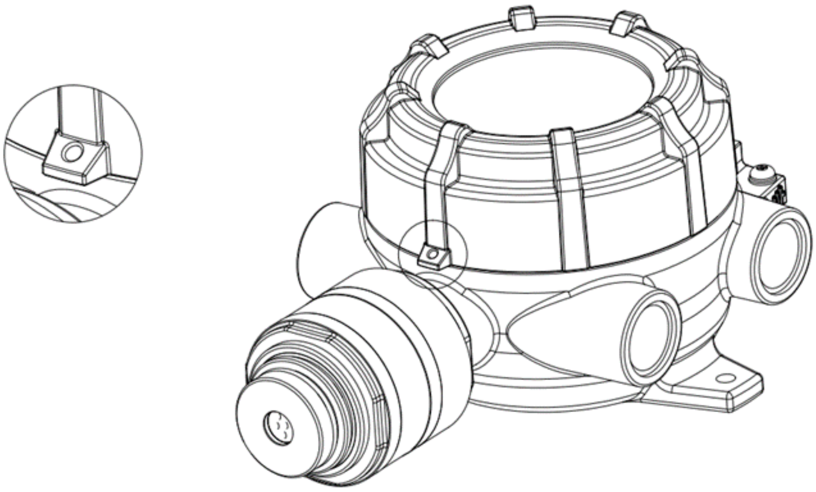
6. Installation

⚠ WARNING

- **Never install, uncover, or manipulate the Detector other than authorized personnel or installation/repair service person from Gastron, otherwise 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. Never open the cover while power is on, unless the area is known to be non-hazardous where explosive atmospheres must not be present.**

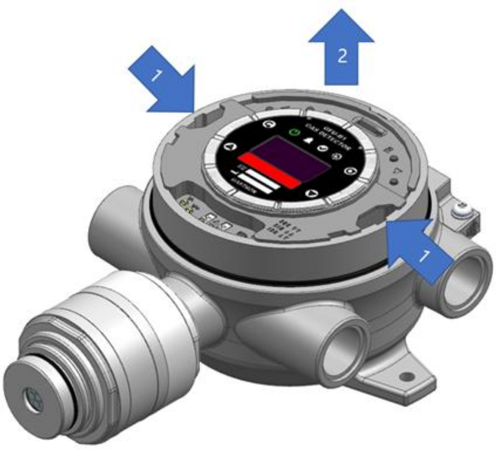
6.1. Separation of the Universal Gas Detector, GFU-B1 Body and Cover

- 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 Display Part appears.



[Figure 11. Slotted Set Screw]

- After the Cover removal, separate the Display Part as follows.

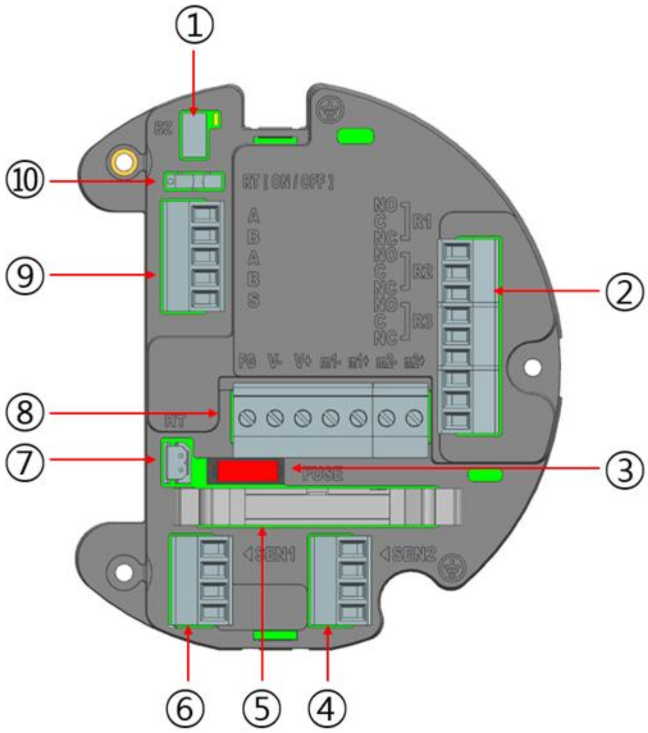


[Figure 12. Display Parts Separation Method]

① Place your fingers into the grooves on both sides of the 'Display Parts' and hold them at the same time.
② While holding, pull the 'Display Parts' forward to separate it from the Gas detector Body.
③ There is a main pcb in the display part and a terminal pcb in the lower part of the body.

6.2. Terminal Connection

- With the Display Part separated, the terminal arrangement of the terminal PCB is shown in the following figure.



[Figure 13. Terminal arrangement of "Terminal Part"]

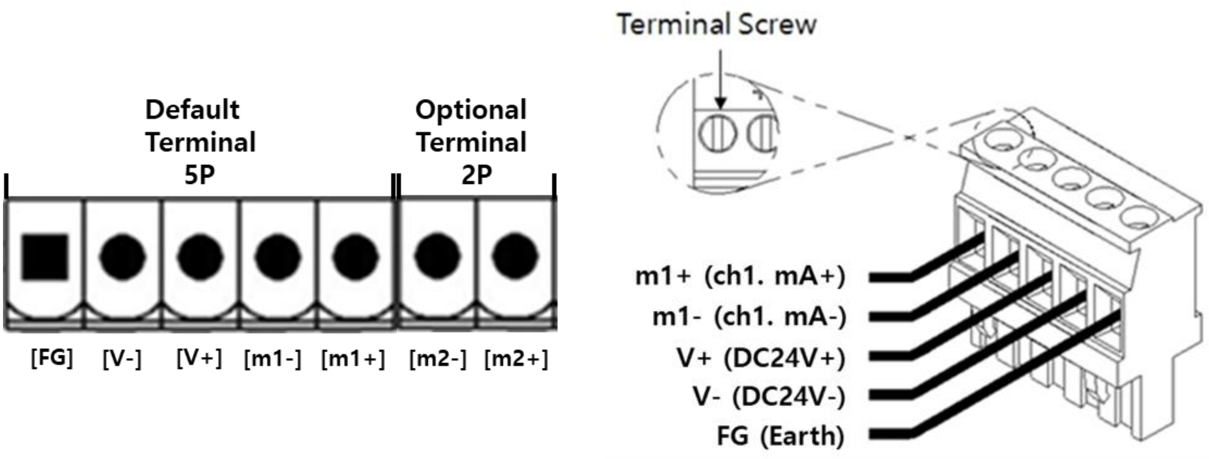
No	Name	Description
1	Buzzer Connector	Buzzer (GTL-150) Interface Connector (Buzzer : Option)
2	Relay Terminal	Alarm & Fault Relay Terminal (Relay Board : Option)
3	Main Fuse	Fuse
4	SEN2 Terminal	Sensor2 Terminal
5	Internal Interface	Main Board I/F Connector
6	SEN1 Terminal	Sensor1 Terminal
7	HART Barrier Connector	HART Barrier Connector (Required when selecting HART port option, HART Barrier (HART Port) : Option)
8	Main Terminal	Power & Output Signal Terminal
9	RS485 Terminal	Isolation RS-485 communication signal (A, B) connection terminal (RS-485 Board : Option)
10	RS485 T-Reg Switch	RS-485 termination resistance selection switch

[Table 6. Terminal Part description]

- The HART Communication Board and RS-485 Communication Board are Option Boards, and only one of them can be used. That is, it is impossible to use both communication functions at the same time.

6.3. Power and 4-20mA Terminal

- If you separate the Display Part, there is the Terminal Block under the Main PCB as shown in the following Figure.
- 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 Main Terminal Block (m1+, m1-, V+, V-, FG) Connector counter-clockwise with a Θ screwdriver and connect DC18-24V power to V+, V- and connect Signal Cable(mA) to m1+, m1- and then, tighten the terminal set screws clockwise to keep the terminals in place and insert it like before the separation.



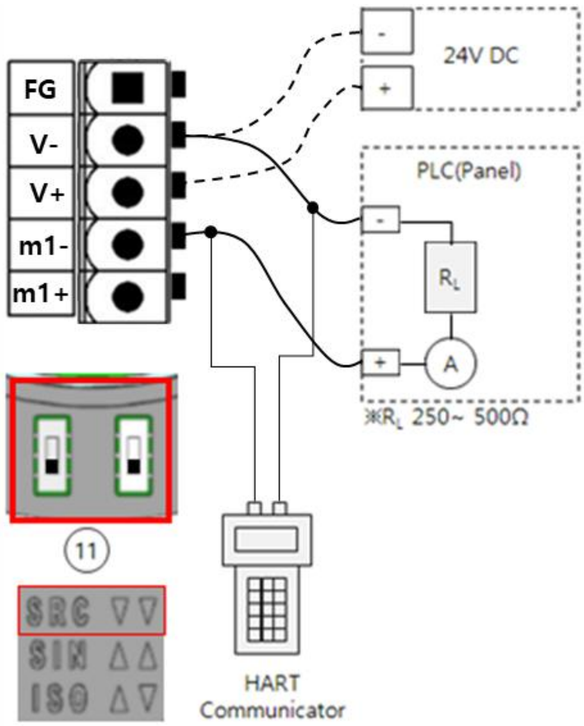
[Figure 14. Main Terminal Structure]

No	Pin Name	Description		
		4~20mA Source Drive	4~20mA Sink Drive	4~20mA Isolation Drive
1	FG	EARTH		
2	V-	GND / POWER (-)		
3	V+	+24V / POWER (+)		
4	m1-	(Ch.1) 4~20mA Source Out	N.C	(Ch.1) 4~20mA Sink Out(-)
5	m1+	N.C	(Ch.1) 4~20mA Sink In(+)	(Ch.1) 4~20mA Sink In(+)
6	m2- (optional)	(Ch.2) 4~20mA Source Out	N.C	(Ch.2) 4~20mA Sink Out(-)
7	m2+ (optional)	N.C	(Ch.2) 4~20mA Sink In(+)	(Ch.2) 4~20mA Sink In(+)

[Table 7. Main Terminal description]

- Be sure to use CVVS or CVVSB 1.5sq↑ Shield Cable before Terminal construction.

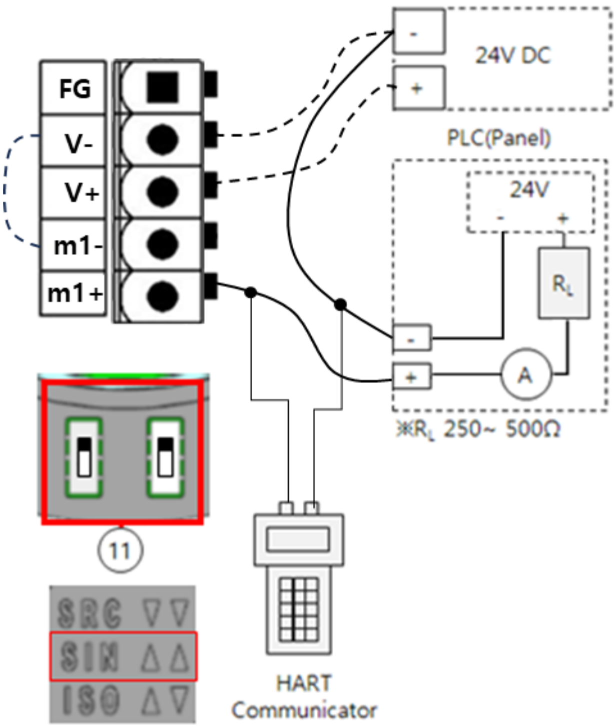
6.3.1. 4~20mA Source drive type wiring method



[Figure 15. 4-20mA Source Configuration]

- Connect 4-20mA Signal Terminal of PLC to 'm1-' of GFU-B1 Terminal. GND(V-) Terminal is used in common with the power.
- Select switch 11 of "Display Part" in the direction as 'SRC'.
- HART Communicator can be used only in models utilizing HART Option Board.

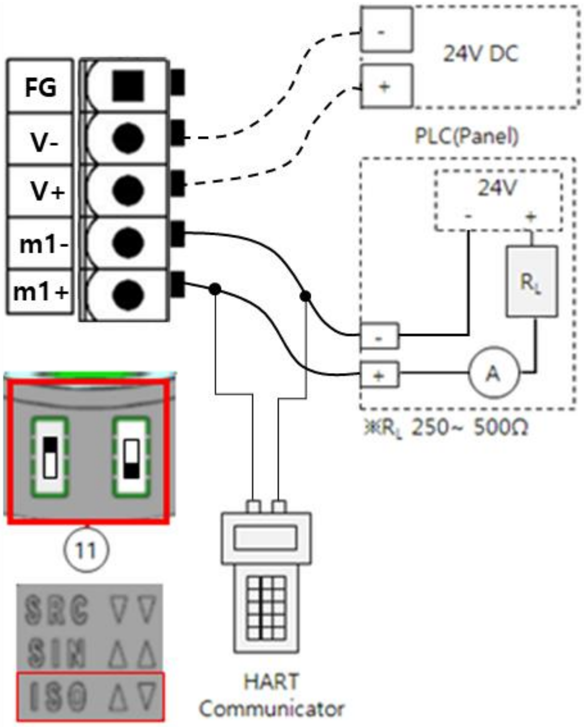
6.3.2. 4~20mA Sink drive type wiring method



[Figure 16. 4-20mA Sink Configuration]

- Connect 4-20mA Power Output (+) Terminal of PLC to 'm1+' of GFU-B1 Terminal, and Power Output (-) Terminal of PLC to '(-)' of GFU-B1 power supply.
- Select switch 11 of "Display Part" in the direction as 'SIN'.
- HART Communicator can be used only in models utilizing HART Option Board.

6.3.3. 4~20mA Isolation drive type wiring method

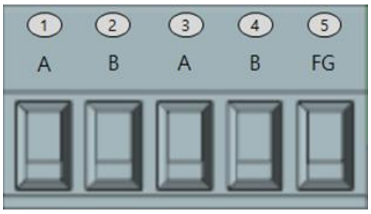


[Figure 17. 4-20mA Isolation Configuration]

- Connect 4-20mA Power Output (+) Terminal of PLC to 'm1+' of GFU-B1 Terminal, and (-) Terminal of PLC to 'm1-' of GFU-B1 Terminal.
- Select switch 11 of "Display Part" in the direction as 'ISO'.
- HART Communicator can be used only in models utilizing HART Option Board.

6.4. RS485 Terminal

6.4.1. Terminal Structure



[Figure 18. RS485 Terminal]

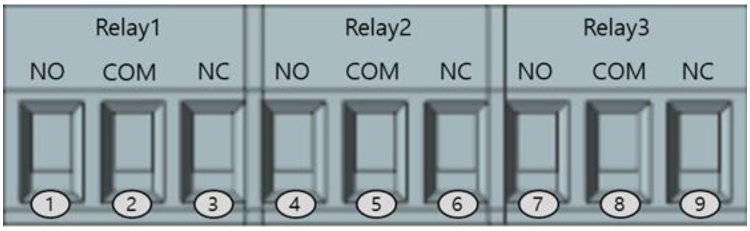
* GFU-B1 MODBUS is optional, connected to the receiving unit by wiring as shown in the table below.

Pin No.	Pin Name	Description
1	A	RS485 A ('TRXD+' or 'A' or 'P')
2	B	RS485 B ('TRXD-' or 'B' or 'N')
3	A	RS485 A ('TRXD+' or 'A' or 'P') * internally connected with Pin No.1, A (RS485 A)
4	B	RS485 B ('TRXD-' or 'B' or 'N') * internally connected with Pin No.2, A (RS485 B)
5	FG	EARTH

[Table 8. RS485 Terminal description]

6.5. Relay Terminal

6.5.1. Terminal Structure



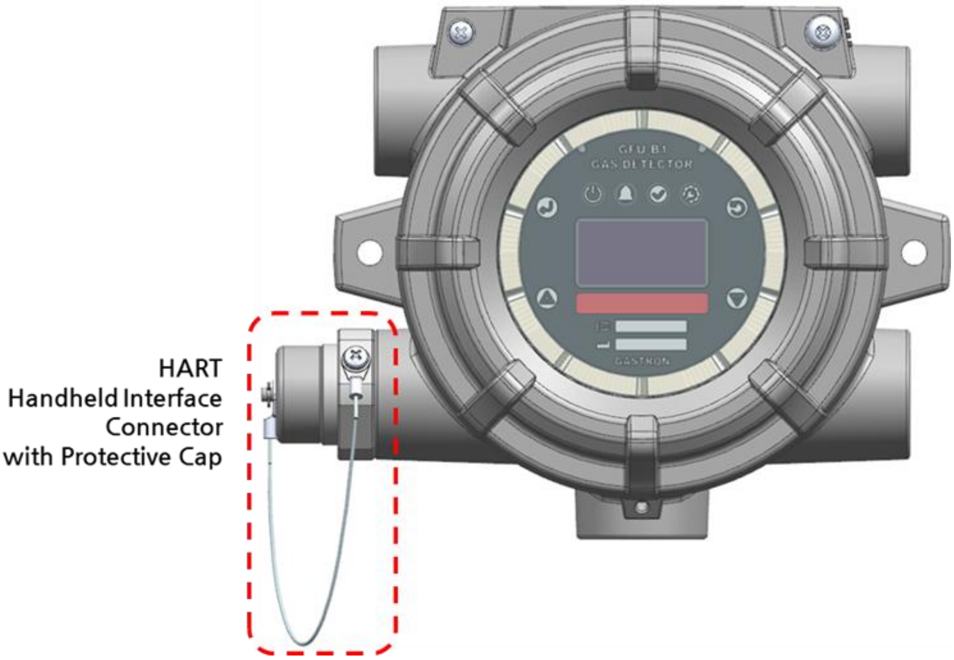
[Figure 19. Relay Terminal]

Pin No.	Pin Name	Description
1	R1_NO	Relay Normally Open
2	R1_COM	Relay COMMON
3	R1_NC	Relay Normally Close
6	R2_NO	Relay Normally Open
5	R2_COM	Relay COMMON
6	R2_NC	Relay Normally Close
7	R3_NO	Relay Normally Open
8	R3_COM	Relay COMMON
9	R3_NC	Relay Normally Close

[Table 9. Relay Terminal description]

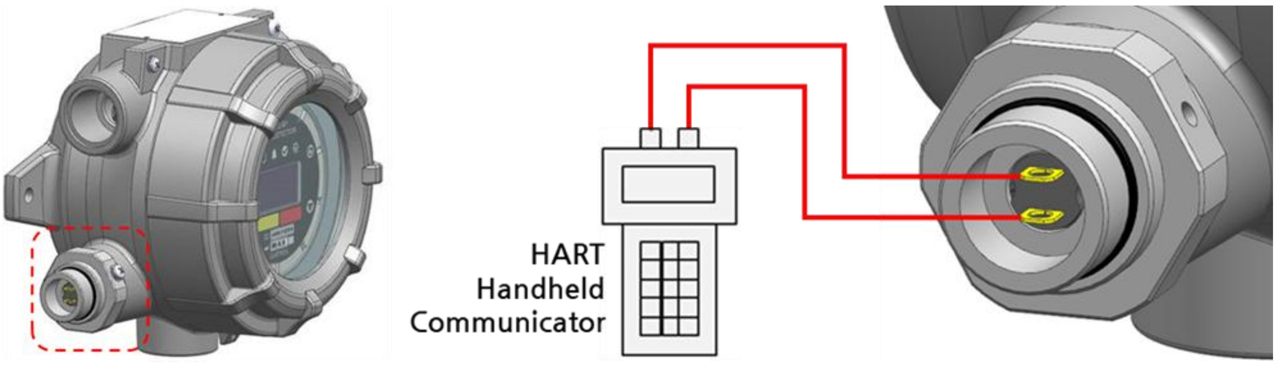
6.6. HART PORT

6.6.1. HART PORT Structure



[Figure 20. HART PORT]

6.6.2. HART PORT Connection



[Figure 21. HART PORT CONNECTION]

Pin. No.	Pin Name	Description
-	HT+	HART Signal +
-	HT-	HART Signal-
The polarity between the two pins does not matter how they are connected.		

[Table 10. HART Port connection description]

6.6.3. Safe Use of Intrinsically Safe HART Handheld Devices

WARNING

- When connecting HART Handheld Device to HART Port, intrinsic safety explosion-proof certification must be considered. The HART Handheld Device must be selected considering the intrinsically safe explosion-proof entity parameters below, and when connecting, the capacitance and inductance must be taken into account not only the values of the HART Handheld Device but also the values of the connection cable. For installations in which both the C_i and L_i of the intrinsically safe apparatus (excluding the cable) exceeds 1% of the C_o and L_o parameters of the associated apparatus, 50% of C_o and L_o parameters are applicable and shall not be exceeded, i.e., the C_i of the device plus the C of the cable must be less than or equal to 50% of the C_o of the associated apparatus, and the L_i of the device plus the L of the cable must be less than or equal to 50% of the L_o of the associated apparatus.

HART I.S. Entity Parameters for the HART Port			
U_i	21.85 V	U_o	23.63 V
I_i	120 mA	I_o	133 mA
P_i	1.0 W	P_o	784 mW
C_i	0 uF	C_o	0.128 uF
L_i	0 mH	L_o	2 mH

[Table 11. HART I.S. Entity Parameters]

- When connecting, each of the following must be true between the HART Port and the HART Handheld Device.

  $U_i \geq U_o$

  $I_i \geq I_o$

  $P_i \geq P_o$

  $C_i + C_{cable} \leq C_o$

  $L_i + L_{cable} \leq L_o$

6.7. Recommended Power Cable Lengths

6.7.1. Maximum Power Cable Length

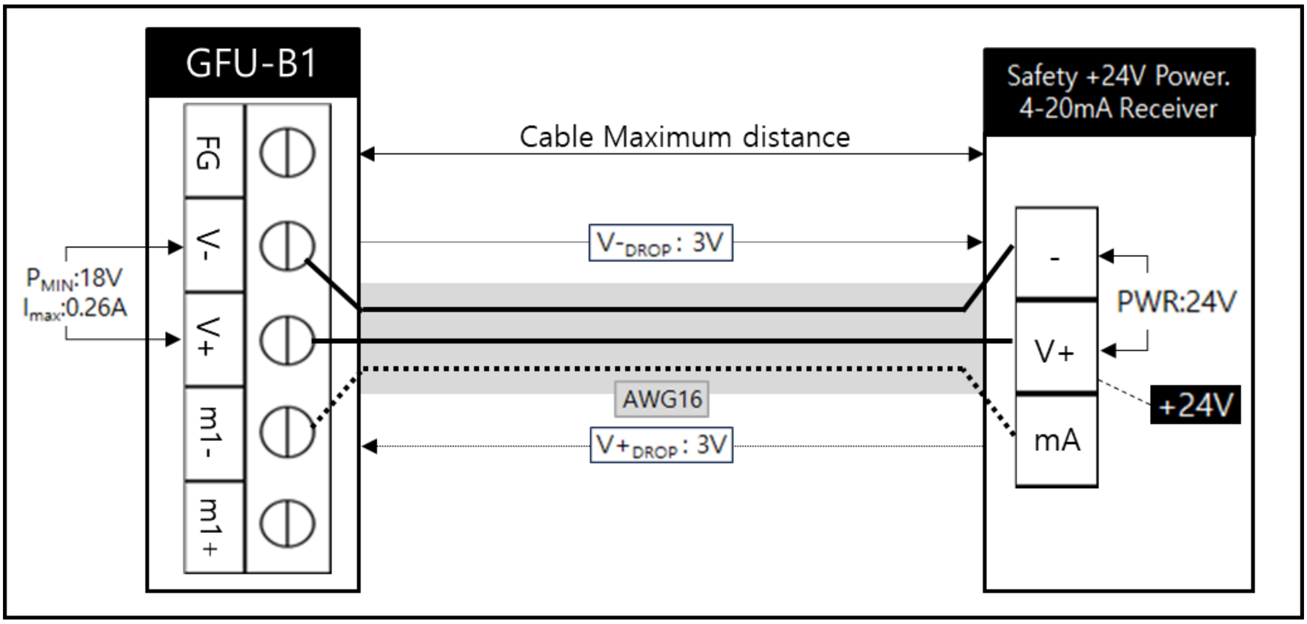
The maximum power cable length between the GFU-B1 and the power supply varies depend on the wire specification. The maximum power cable length can be calculated as follows:

Maximum Wire Length = $V_{MAX\_ALLOWABLE\_DROP} \div I_{MAX} \div WIRE_{R/m} \div 2$

- $V_{MAX\_ALLOWABLE\_DROP}$: Maximum Allowable Power Loop Voltage Drop (= Power Supply voltage - min. operating voltage)
- I_{MAX} : Maximum current of the GFU-B1
- $WIRE_{R/m}$: Resistance of the wire (ohms/meter, generally a value found on the wire manufacturer's specifications)

※ Example of maximum wire length that can be installed using a 24Vdc power supply and 16AWG wire

- Power supply voltage = 24 Vdc
- $V_{MAXDROP}$ = 24 - 18 = 6V (GFU-B1 minimum operating voltage : 18 Vdc)
- I_{MAX} = 0.26A (260mA)
- **6 ÷ 0.26 ÷ 0.01318 ÷ 2 ≒ 875.4523m**



[Figure 22. Connection Cable Max Distance]

6.7.2. Determination for the Power Cable Maximum Length

- The current of the Universal Gas Detector, GFU-B1 is determined by the sum of the current of the basic device, Universal Transmitter GTA-B1, and the current of the consisting smart sensor module(s). In other words, the current of GFU-B1 may vary depending on the smart sensor module configuration.
- The table below is a representative maximum power cable length exemplified by the GTA-B1 with one GSA-11E configuration. (I_{MAX} 272mA : GTA-B1 260mA + GSA-11E 12mA, The table below is an example; the length may vary depending on the resistance specification of the cable used.)

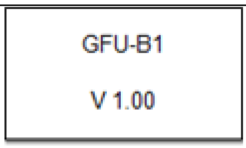
AWG	mm^2	Copper resistance (ohms/m)	Meters
12	3.31	0.00521	2116
14	2.08	0.00828	1332
16	1.31	0.01318	836
18	0.82	0.02095	526
20	0.518	0.0333	331

[Table 12. GFU-B1 power cable installation length (example)]

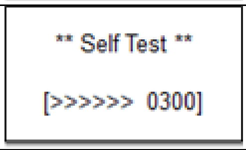
7. Operation Flow

7.1. Power On

- After wiring of and power supplying to Power Terminal on Terminal PCB board, the following information will be displayed on the LCD display. About 30 minutes of stabilization time is required, normal operation begins after full stabilization.



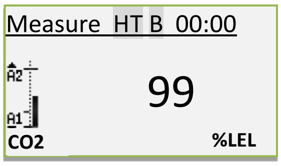
➢ When power is switched on, model name is displayed in 1st line and firmware version of sensor in 2nd line on OLED display.

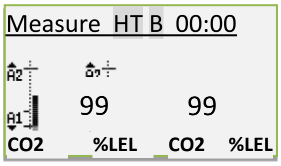


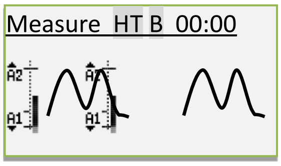
➢ Self test is performed for about 30 seconds and progress condition is displayed by '>' text in 2nd line on OLED display.

7.2. Measuring Mode

- After the self test, the device automatically enters the measurement mode.







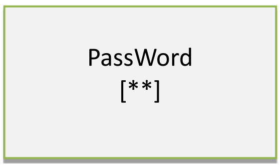
➢ The measurement mode consists of a measurement value display screen that displays the gas measurement result in numbers and a trend display screen that displays the measured gas value in the form of a graph in units of 1 second.

➢ In the case of a dual sensor, the basic measurement screen and the trend display screen are divided to display each gas measurement value.

➢ Intuitive recognition is possible by displaying the level of measured value and position of alarm in the form of a bar graph.

7.3. Setting Menu

- After entering the password, enter the setting mode.

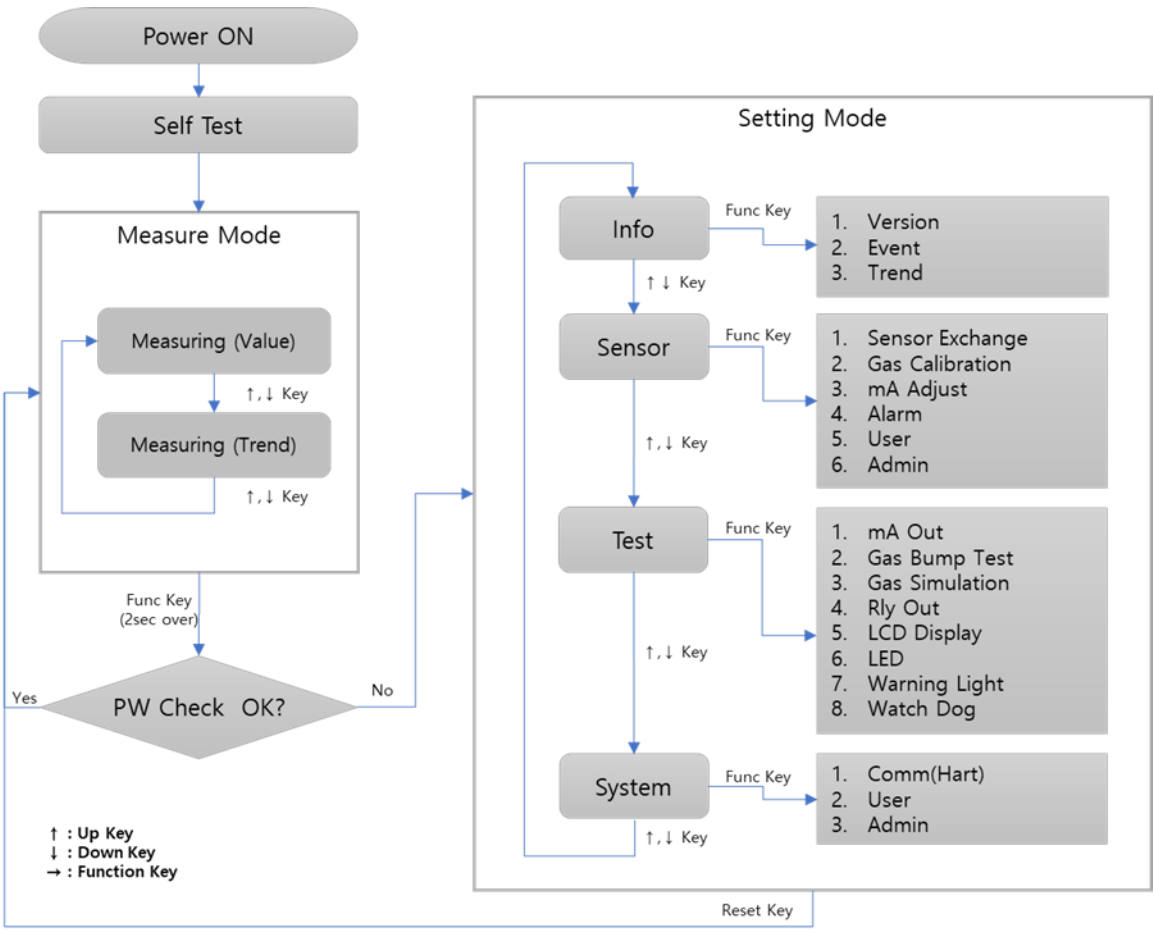


➢ When contacting "FUNC" key for over 2 seconds by magnet-bar under measuring condition , this key enters Password mode .

	➢ Contact “FUNC” key after setting Password by using either““▲””key or“▼” key.
TopMenu 1.Info 2.Sensor 3.Test TopMenu 4.System	➢ The setup menu consists of four main menus. 1. Info menu: Menu to check various information of TRANSMITTER and sensor 2. Sensor: Menu for setup and configuration of connected sensors 3. Test: Transmitter and sensor test menu 4. System: Detector setting menu

7.4. Mode Flow

- After power on, enter the measurement mode through a process of self-diagnosis. At this time, it is possible to enter the System Mode through the front Key operation.
- Touching the "RESET" key in Top Setting Mode screen will revert to measurement mode; and touching "RESET" key in each Program Setting screen will revert to upper level.



[Figure 23. GFU-B1 Mode Configuration]

- Operation keys for the system mode control of detector are defined as follows.

Item	Name	Description
FUNC	Function Key	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	Move to the upper menu item or increase a setting value
↓	Down Key	Move to the lower menu item or decrease a setting value

[Table 13. Funciton Key Description]

8. MENU Description

8.1. Top Menu

```
TopMenu
  1.Info
  2.Sensor
  3.Test
```

```
TopMenu
  4.System
```

- When Password is correct, enter into Menu Item
- Whenever contacting “▲”key or “▼”key, mode is changed in the specified order. (Info → Sensor → Test → System)

8.2. Information Setting

```
1>Info
  1.Version
  2.Event
  3.Trend
```

- Menu to check various information of TRANSMITTER and sensor
  1. Version: Displays the version of the transmitter and sensor.
  2. Event: Shows event information such as Calibration and Fault
  3. Trend: Shows trend of the measured gas value as a graph.

8.2.1. Version

```
1-1>VerDetail
  B1:xxx
  T-FW:00.00A
  T-UpDate:220101
  T-HW:V00.00
```

```
1-1>VerDetail
  S1:11EC/A1
  S1GAS:T1/NH3
  S1-FW:00.00A
  S1-UpDate:220101
  S1-HW:V00.00:11EC/A1
```

- Displays the F/W and H/W version and date of the transmitter and sensor 1/2, the type of sensor and measurable gas information.
- Contact “FUNC” key after select Version by using either “▲” key or “▼” key.
- Contact "▲" Key or "▼" Key, displayed information is changed.

1-1>VerDetail S2:11EC/A1 S2GAS:T1/NH3 S2-FW:00.00A S2-UpDate:220101 S2-HW:V00.00:11EC/A1	

8.2.2. Event

1.ALL 2.CAL 3.FAULT 4.SYS	➢ To view event log information, select the log history classification method from the pop-up menu. ➢ Event history can be checked in four configurations: 1. All, 2. Calibration Information, 3. Error/Warning, and 4. System Log.
1-2>EvtAll [2022-09-15] 001)12:34, A01, xxxx 002)12:24, F01, xxxx 003)12:14, S01, xxxx	➢ Displays all event log (Calibration, Fault, System) information. ➢ Contact “FUNC” key after select ALL by using either “▲” key or “▼” key.
1-2>EvtCAL [2022-09-15] 001)12:34, C01, xxxx 002)12:24, C01, xxxx 003)12:14, C01, xxxx	➢ Calibration history is displayed. ➢ Contact “FUNC” key after select CAL by using either “▲” key or “▼” key.
1-2>EvtFault [2022-09-15] 001)12:34, F01, xxxx 002)12:24, F01, xxxx 003)12:14, F01, xxxx	➢ Displays the occurrence history of Fault/Warning, etc. ➢ Contact “FUNC” key after select FAULT by using either “▲” key or “▼” key.
1-2>EvtSys [2022-09-15] 001)12:34, S01, xxxx 002)12:24, S01, xxxx 003)12:14, S01, xxxx	➢ Displays the history of firmware updates, system restarts, etc. ➢ Contact “FUNC” key after select SYS by using either “▲” key or “▼” key.

8.2.3. Trend

Sel SEN 1.Sen1 2.Sen2	➢ Select a Sen1 or Sen2 in the pop-up window, the trend of measured gas is displayed as a graph.
1-3>Trend Sn220101 	➢ Gas value measured by the selected sensor is displayed as a trend graph. ➢ Displayed in time scale units.

8.3. Sensor Setting

	➢ Menu for setup and configuration of connected sensors

2>Sn.Sensor 1.ExChange 2.Gas Calib 3.mA Adj	➢ The sensor setup can be checked in 6 different configurations. 1. Sensor exchange 2. Calibration 3. 4~20mA adjustment 4. Alarm 5. User setting 6 Administrator setting

8.3.1. Sensor ExChange

2-1>Sn.Change Sensor Change? [YES]	➢ This menu is for sensor replacement. ➢ Change to Yes or No with "▲" key or "▼" key and start the exchange by contact the Func key on Yes. ➢ When sensor exchange starts, the sensor power is turned off.
2-1>Sn.Change Sensor Replace? [YES]	➢ Remove the sensor connected to the detector and replace it with a new sensor, and then contact the "Func" Key.
2-1>Sn.Change Sensor Init? [YES]	➢ When the sensor replacement is complete, contact the "Func" key from "Yes" to initialize the exchanged sensor.
2-1>Sn.Change Zero Cal? [YES]	➢ Perform zero gas calibration. ➢ For detailed items of Zero Calibration, refer to "Zero Calibration" menu. (However, select No using the "▲" key or "▼" key to exit this sensor exchange menu and move to the upper menu.)
2-1>Sn.Change "Zero Cal Process"	➢ Perform Zero Gas Calibration operation. For detailed items of Zero Calibration, refer to "Zero Calibration" menu.
2-1>Sn.Change Span Cal? [YES]	➢ After completing Zero Calibration, select whether to perform Span Calibration.
2-1>Sn.Change "Span Cal Process"	➢ Perform Span Calibration operation. For detailed items of Span Calibration, refer to "Span Calibration" menu.

2-1>Sn.Change Sen Change Done [YES]	➢ When Span Calibration is completed, sensor replacement is complete. ➢ In "Yes", contact the "Func" key to exit the sensor replacement menu.

8.3.2. Gas Calibration

2-2>Sn.GasCal 1.Zero 2.Span 3.CRSE	➢ It is a menu that can carry out sensor calibration by function and consists of the following items. 1. Zero Calibration 2, Span Calibration 3. Cross Sensitivity 4. Calibration initialize
2-2-1>Sn.Zero Zero V:0.00 Ready? [Yes] 2-2-1>Sn.Zero Zero V:-- Progress [Yes] 2-2-1>Sn.Zero Zero V:-- Wait... [Yes] 2-2-1>Sn.Zero Zero V:-- Done [OK]	➢ Check the measured value of the currently supplied zero gas with the Zero Calibration menu. ➢ When the measured value of Zero Gas is confirmed, contact the "func" key. ➢ When the Zero Calibration process is completed, exit the zero calibration menu.
2-2-2>Sn.Span Span V:50.0 Ready? [Yes] 2-2-2>Sn.Span Spa V:50.0 Span Vol Adj [50.0]	➢ Check the measured value of the currently supplied span gas with the Span Calibration menu. ➢ When the measured Span Gas value is stable, adjust the Span Vol Adj value with "▲, ▼" keys to match the measured Span Gas value. ➢ When span adjustment is completed, contact the "func" key. ➢ When the Span Calibration process is completed, exit the span calibration menu.

2-2-2>Sn.Span Span V:-- Progress... [Yes] 2-2-2>Sn.Span Span V:-- Wait... 2-2-2>Sn.Span Span V:-- Done [OK]	
2-2-3>Sn.CRSE 1.00 -> [0.00]xGAS	➢ Set the cross sensitivity(0.1 ~ 5.0) of the sensor. ➢ Contact the "▲" key or "▼" key to set the value in units of 0.01.
2-2-4>Sn.Init Sen Cal Init Execute? [Yes] 2-2-4>Sn.Init Sen Cal Init Wait... 2-2-4>Sn.Init Sen Cal Init Done [OK]	➢ Initialize calibration(Zero Calibration, Span Calibration, cross sensitivity) values of sensor.

8.3.3. mA Adjust

2-3>Sn.mAadj 1.4mA Adj 2.20mA Adj 3.mA OS	➢ "mA Adjust" is a menu to adjust the current output value of the transmitter and consists of the following items. 1.4mA Adj 2.20mA Adj 3.mA OS 4. mA Adj Init
2-3-1>Sn.Adj4mA 4mA Adjust 4.00 -> [4.00]mA	➢ Adjust the 4mA output. ➢ Contact the "▲" key or "▼" key to set the value in units of 0.01.
	➢ Adjust the 20mA output.

2-3-2>Sn.Adj20mA 20mA Adjust 20.00 -> [20.00]mA	➢ Contact the "▲" key or "▼" key to set the value in units of 0.01.
2-3-3>Sn.AdjOfs Sen mA Offset 0.100 -> [+/-0.00]mA	➢ Set the offset value for 4~20mA output. ➢ Contact the "▲" key or "▼" key to set the value in units of 0.01.
2-3-4>Sn.AdjInit Sen mA Adj Init Execute? [Yes] 2-3-4>Sn.AdjInit Sen mA Adj Init Wait… 2-3-4>Sn.AdjInit Sen mA Adj Init Done [OK]	➢ Initialize all output adjustment values of 4~20mA. ➢ Items to be initialized are as follows. : 4mA Adj, 20mA Adj, Adj Offset

8.3.4. Alarm

2-4>Sn.Alarm 1.A1 Dir 2.A1 Data 3.A1 DB	➢ It is a menu to set the alarm operation and consists of the following items, and the setting method for Sensor1 and sensor2 is same. 1.A1 Dir 2.A1 Data 3.A1 DB 4.A1 Dly 5.A2 Dir 6.A2 Data 7.A2 DB 8.A2 Dly
2-4-1>Sn.A1Dir Alm1 Direction Dec -> [Dec]	➢ It is a item of setting direction of Alarm 1 operation and whenever contacting "▲" key or "▼" key, "Inc" or "Dec" is displayed.

	➢ "Inc" Mode is operated when it is bigger than or same as Alarm 1 setting value, and "Dec" mode is operated when it is smaller than or same as Alarm1 setting value.
2-4-2>Sn.A1Data Alm1 Data Lv. 1 -> [99]	➢ This is the mode to set the value of Alarm1 level, and whenever "▲" or "▼" key is touched, Alarm1 value increases or decreases. ➢ When the desired Alarm1 value is displayed, touch the "FUNC" key to set the Alarm1 value.
2-4-3>Sn.A1DB Alm1 DeadBand 0 -> [10]%FS	➢ This is the mode to set the operating range of Alarm1. The value increases or decreases whenever the "▲" or "▼" key is contacted. ➢ When Alarm1 is in "Increase Mode", in Alarm1 value+Dead Band value, Alarm1 is operated and in Alarm1 value-Dead Band value, it is released. ➢ When the desired value is displayed, contact the "FUNC" key to set the dead band value.
2-4-4>Sn.A1Dly Alm1 DlyTime 1 -> [2]Sec	➢ Alarm1 is the mode to set the delay time, and the value increases or decreases whenever the "▲" or "▼" key is contacted. ➢ The number displayed represents 0 to 60 seconds. When the desired value is displayed, contact the "FUNC" key to set the alarm delay time.
2-4-5>Sn.A2Dir Alm2 Direction Dec -> [Dec]	➢ It is a item of setting direction of Alarm 2 operation and whenever contacting "▲" key or "▼" key, "Inc" or "Dec" is displayed. ➢ "Inc" Mode is operated when it is bigger than or same as Alarm 2 setting value, and "Dec" mode is operated when it is smaller than or same as Alarm2 setting value.
2-4-6>Sn.A2Data Alm2 Data Lv. 1 -> [99]	➢ This is the mode to set the value of Alarm2 level, and whenever "▲" or "▼" key is touched, Alarm2 value increases or decreases. ➢ When the desired Alarm2 value is displayed, touch the "FUNC" key to set the Alarm2 value.
2-4-7>Sn.A2DB Alm2 DeadBand 0 -> [10]%FS	➢ This is the mode to set the operating range of Alarm2. The value increases or decreases whenever the "▲" or "▼" key is contacted.

	➢ When Alarm2 is in "Increase Mode", in Alarm2 value+Dead Band value, Alarm2 is operated and in Alarm1 value-Dead Band value, it is released. ➢ When the desired value is displayed, contact the "FUNC" key to set the dead band value.
2-4-8>Sn.A2Dly Alm2 DlyTime 1 -> [2]Sec	➢ Refer to 'A1Dly' menu above

8.3.5. User

2-5>Sn.User 1.Gas 2.Unit 3.DotP	➢ User setting menu consists of the following items, and and the setting method for Sensor1 and sensor2 is same. 1.Gas 2.Unit 3.DotP 4.FScl 5.Under 6.Skip 7.SkipB 8.TempComp 9.W-Up Time 10.EntryPos
2-5-1>Sn.Gas Gas Setting O2 -> [NH3]	➢ It is a menu to set the Gas Name, and the Gas name is changed whenever "▲" key or "▼" key is touched.
2-5-2>Sn.Unit Unit Setting %VOL -> [%VOL]	➢ t is a menu to set the gas measurement unit, and the gas measurement unit is changed whenever "▲" key or "▼" key is touched. (%VOL, %LEL, PPM, PPB, mg/m3).
2-5-3>Sn.DotP Dec Point 0 -> [0.0]	➢ It is a menu to set the position of the decimal point, and the position of the decimal point is changed whenever the "▲" or "▼" key is touched. (0.100/1.00/10.0/100.0)
2-5-4>Sn.FScl Dec Scale 1000 -> [1000]	➢ It is a menu to set the high scale value to be displayed in case of Full Range, and whenever the "▲" or "▼" key is touched, the scale value increases or decreases. (1000, 100, 10, 1)

2-5-5>Sn.Under UnderChk/Disp OFF/OFF [OFF]/[OFF]	➢ This is an item to turn ON/OFF the Under Mode setting. ➢ It changes ON/OFF state by contacting "▲" key or "▼" key. In case of ON, it is set to Under Mode when gas below -10% is measured. ➢ In case of OFF, values less than -10% are treated as zero.
2-5-6>Sn.Skip G-Skip Chk/Lv OFF/0.0 [OFF]/[0.0]	➢ If the measured gas value is entered below -10%, the character "UNDER" is displayed every second and 4~20mA operates as 0mA. (2mA when using HART) ➢ This function works only when the UNDER function is ON. ➢ Setting menu to display fluctuating display value as 0 when gas measured value is very small
2-5-7>Sn.SkipB G-Skip Min/Max 0.0/3.0 [0.0]/[3.0]	➢ Setting menu to improve the fluctuation range of the displayed value by designating the range (maximum / minimum value) of the measured gas value
2-5-8>Sn.TempC Temp Compensate OFF -> [OFF]	➢ Menu to set whether to apply the temperature compensation function
2-5-9>Sn.WupT WarmUp Time(s) 1 -> [1]Sec	➢ Stabilization time required when power is applied to the sensor
2-5-10>Sn.EntP Entry Position [Left Up]	➢ Combination position setting menu of the sensor installed in the transmitter

8.3.6. Admin

Exclude with Factory Menu

8.4. Test Menu

Exclude with Factory Menu

8.5. System Menu

4>System 1.Com(HART) 2.User 3.Admin	➢ Detector setting Menu

8.5.1. ComHART

4-1>ComHaRT 1.Addr 2.C-Mode 3.F-AssyNo	➢ Menu to check/change the setting value of Option HART
4-1-1>Addr HART Addr No. 0 -> [00]	➢ Menu to check/change the Address value of Option HART
4-1-2>CMode CMode Enable. ON -> [ON]	➢ Option menu for checking/changing current mode application of HART
4-1-3>FAsyNo Final Assy No [1]	➢ Menu to check/change the setting value of the final AssyNo. of Option HART

8.5.2. User

4-2>User 1.User PW 2.Rly LAT 3.InhTO	➢ It is a user setting menu of the System menu and consists of the following items. 1.User PW 2.Rly LAT 3.InhTO 4.InhLv 5.DispMD 6.Disp2nd 7.PwrSvMD 8.W-Up mA 9.FLT mA 10.MT mA 11.OV mA
4-2-1>UserPW Password Set OFF -> [OFF]	➢ It is a menu to change the password to enter the setting menu, and set a number between 0 and 99.

4-2-2>RlyLat Relay Latch Set OFF -> [OFF]	➢ When an alarm occurs, set the function to maintain the output state until the user cancels the relay output.
4-2-3>InhTO Inhibit TimeOut 0 -> [0]s	➢ It is a menu to set the Inhibit Timeout value, and external output (Alarm, 4~20mA, Warn-Light, etc..) signals are not generated during the set time.
4-2-4>InhLv Inhibit Chk/Lv OFF/0.00 -> [OFF]/[0.00]	➢ A menu to set whether to apply Inhibit mode and the level of output current (4~20mA).
4-2-5>DispMD Display Mode Digit -> [Digit]	➢ Menu to set the display format of the Measuring screen 1. Digit: fixed gas value digit display 2. Trend: Fixed trend graph display of measured GAPS value 3. Manual: The Digit screen and Trend screen are changed according to the user's button input ("▲, ▼").
4-2-6>Disp2nd Display 2nd Msg None -> [None]	➢ Menu to set the type of message to be displayed on the Measuring screen ➢ Changes the display message type according to the input of the "▲" and "▼" buttons. None (not displayed), 1 (sensor temperature), 2 (transmitter temperature), 3 (percentage gas), 4 (mA output value)
4-2-7>PwrSvMD Power Save Mode OFF -> [OFF]	➢ Low power mode setting menu
4-2-8>W-UpmA SEN WarmUp mA 0.0 -> [0.0]mA	➢ Menu to set the current value output to the outside during sensor warm-up
4-2-9>FLTmA Fault Type mA 0.0 -> [0.0]mA	➢ Menu to set the current output to the outside when a fault occurs
4-2-10>MTmA Maint Mode mA 0.0 -> [0.0]mA	➢ Menu to set the current value output to the outside when maintenance is set

4-2-11>OVmA Over Range mA 0.0 -> [0.0]mA	➢ Menu to set the current value output to the outside when over range of the measured gas occurs

8.5.3. Admin

- Exclude with Factory Menu.

9. Troubleshooting

9.1. Fault List

Fault Message	Description & Condition	Possible cause
E-11	Sensor module connect fault	Occurs when sensor module is not connected.
E-12	Incorrect cable connection or sensor cartridge failure	Occurs when the transmitter and sensor are not communicating.
E-13	Transmitter Board EEPROM fault	Occurs when there is a transmitter EEPROM checksum error.
E-14	Input voltage too low	Occurs when 24V main power input is less than 18V.
E-15	Transmitter Board Flash Memory fault	Occurs when the transmitter flash checksum is failure.
E-16	Transmitter Board SRAM fault.	Occurs when a transmitter SRAM fault.
E-17	Transmitter overheating	Occurs when the transmitter MCU temperature is too high.
E-18	Sensor overvoltage or overcurrent	Occurs when sensor overvoltage or overcurrent
E-19	Sensor fault.	Occurs when the sensor is not installed or sensor fault.
E-20	Sensor Cartridge fault.	Occurs when the gas sensor is not connected to the sensor cartridge.
E-21	Sensor EEPROM Checksum fault	Occurs when there is a sensor EEPROM checksum error.
E-22	Sensor hunting.	Occurs when If the gas measurement value is continuously hunting.
E-23	Sensor self-diagnosis fault.	Occurs when the sensor status is bad during sensor self-diagnosis.

[Table 14. Fault List]

9.2. Warning List

Warning Message	Description & Condition	Possible cause
W-11	incorrect calibration data	Occurs when there is an error in the manual zero detection voltage value.
W-12	Transmitter overheating	Occurs when the transmitter MCU temperature is too high.
W-13	Span reference error	The span reference for calibration is defective.
W-14	High Scale error	Occurs when the High Scale setting is incorrect.
W-15	Gas Alarm1 Data error	Occurs when the Gas Alarm1 setting is incorrect.
W-16	Gas Alarm2 Data error	Occurs when the Gas Alarm2 setting is incorrect.
W-17	Time setting error	If there is an error in time setting (if RTC data is not transmitted from the transmitter within 1 minute after booting)
W-18	Calibration validity error	Occurs when the calibration validity period has elapsed.
W-19	Sensor manufacturing date error	Occurs when sensor manufacturing date is not entered.

[Table 15. Warning List]

9.3. Recovery List

No	Possible cause	Corrective action
1	Sensor module connect fault	1) Check Senor module wiring. 2) Sensor Module must be returned to the factory or authorized service center for repair.
2	Sensor module fault	Sensor Module must be returned to the factory or authorized service center for repair.
3	ADC fault of Transmitter Board	Transmitter Board must be returned to the factory or authorized service center for repair.
4	EEPROM fault of Transmitter Board	1) After EEPORM format, Re-setting and re-calibration after factory reset. 2) If the same fault occurs, transmitter Main Board must be returned to the factory or authorized service center for repair.
5	MPU fault of Transmitter Board	Transmitter Board must be returned to the factory or authorized service center for repair.
6	Gas sensing fault	Sensor Module must be returned to the factory or authorized service center for repair.

[Table 16. Recovery List]

10. 485 MODBUS Interface

10.1. RS485 Communication configuration

1) Baud rate : 115200 bps
2) Data bits : 8 bits
3) Stop bit : 1 bit
4) Parity : Even

10.2. Address Structure

[Input Register]

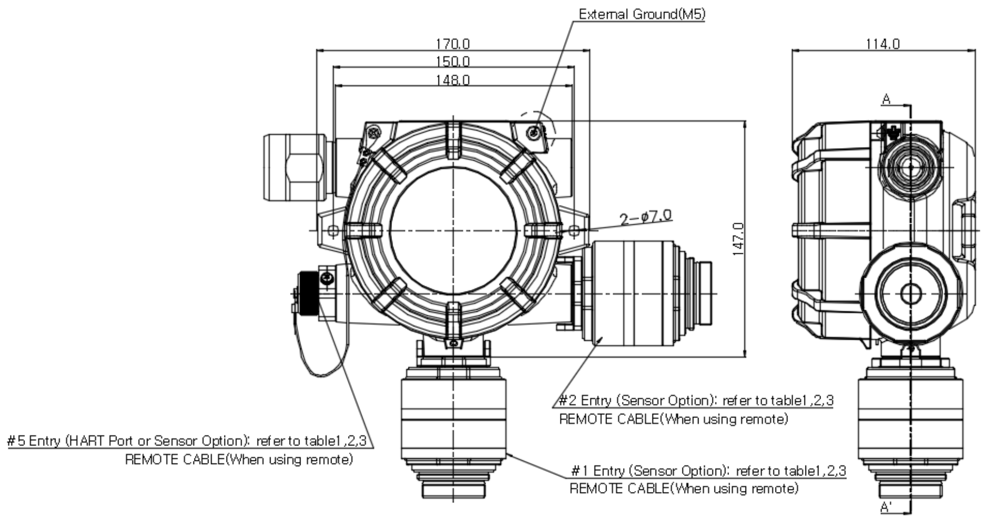
Category	Address	Bits	Description
Measured gas concentration	30001	BIT15~0	Measured gas concentration value of Sensor1
	30002	BIT15~0	Measured gas concentration value of Sensor2
High Scale setting value	30003	BIT15~0	High scale setting value of sensor1
	30004	BIT15~0	High scale setting value of sensor2
Primary Alarm setting value	30005	BIT15~0	Primary alarm setting value of sensor1
	30006	BIT15~0	Primary alarm setting value of sensor2
Secondary Alarm setting value	30007	BIT15~0	Secondary alarm setting value of sensor1
	30008	BIT15~0	Secondary alarm setting value of sensor2
Temperature value	30009	BIT15~0	Current temperature value of sensor1
	30010	BIT15~0	Current temperature value of sensor2
Error Code	30011	BIT15~0	Error Code1
	30012	BIT15~0	Error Code2
Gas dot point and Unit	30013	BIT0~2	Decimal point indicator (sensor1) 0: 0 Point 1: 1 Point 2: 2 Point 3: 3 Point 4~7: Reserved
		BIT3~7	Reserved
		BIT8~11	Concentration units(Sensor1) 0: PPM 1: PPB 2: %Volume 3: %LEL 4: mg/m3 5~7: Reserved
		BIT12~15	Reserved
	30014	BIT0~2	Decimal point indicator (sensor2)

			0: 0 Point 1: 1 Point 2: 2 Point 3: 3 Point 4~7: Reserved
		BIT3~7	Reserved
		BIT8~11	Concentration units(Sensor2) 0: PPM 1: PPB 2: %Volume 3: %LEL 4: mg/m3 5~7: Reserved
		BIT12~15	Reserved
Gas detector State value	30015	BIT0	Alarm 1 active state of sensor 1
		BIT1	Alarm 2 active state of sensor 1
		BIT2	Alarm 1 active state of sensor 2
		BIT3	Alarm 2 active state of sensor 2
		BIT4	Fault active state
		BIT5	Warning active state
		BIT6	Maintenance Mode state
		BIT7	Test Mode state
		BIT8	Calibration Mode states
		BIT9	Reserved
		BIT10	Reserved
		BIT11	Reserved
		BIT12	Reserved
		BIT13	Reserved
		BIT14	Reserved
		BIT15	Toggle Bit(Bit inversion every 2 seconds)
Reserved	30016	BIT15~0	
Reserved	30017	BIT15~0	
Reserved	30018	BIT15~0	
Reserved	30019	BIT15~0	
Reserved	30020	BIT15~0	

[Table 17. RS485 Address Structure]

11. Appearance drawing and Dimensions

11.1. GFU-B1_(GSA SENSOR - SERIES)



[Figure 24. GFU-B1_(SENSOR-SERIES) DIMENSION]

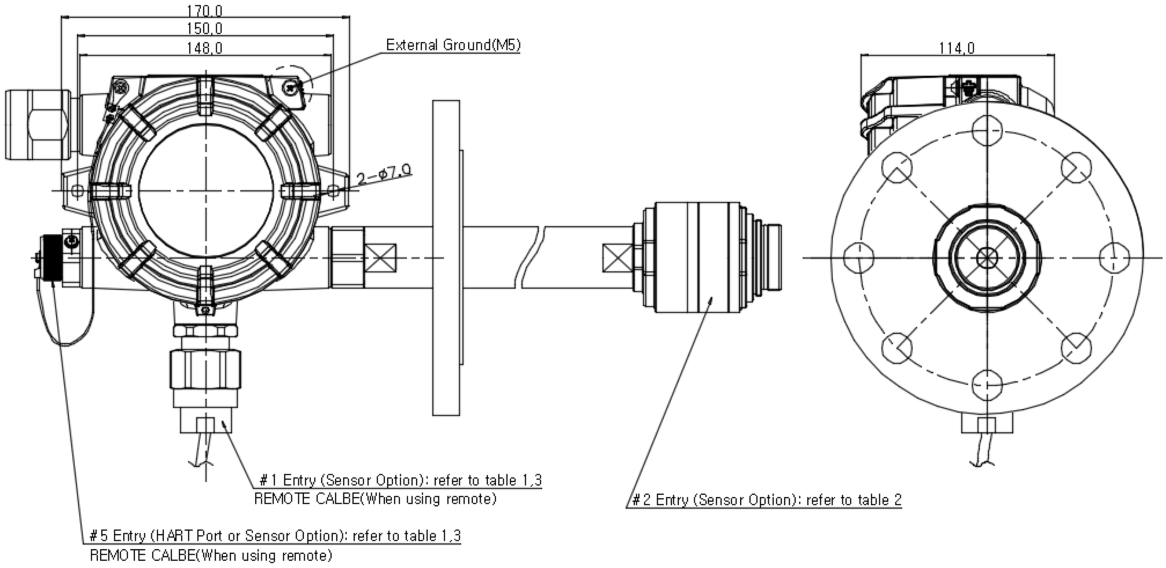
* Max. Triple sensor combination

Table 1 : Remote(Junction Box) Installaion (dual)	
Type	**#1 / #2 / #5 Entry (Sensor Option)** **Model**
REMOTE	GSA(JUNCTION BOX) INTEGRATED TYPE (GSA-SENSOR-SERIES)
	GSA(JUNCTION BOX) PIPE FLANGE (GSA-SENSOR-SERIES)
	GSA(JUNCTION BOX) PIPE FLANGE (GSA-SENSOR-10S)

Table 2 : Integrated Installaion (dual)	
Type	**#1 / #2 / #5 Entry (Sensor Option)** **Model**
DIFFUSION	GSA-11 E / G
	GSA-10 C
	GSA-20 R / B
FLOW METHOD	GSA-11 E / G (Flow Adapter)
	GSA-10 C (Flow Adapter)
	GSA-20 R / B
HART PORT (#5 Entry only)	GFHO-BP1(HART PORT)

Table 3 : Integrated Installaion (Triple)	
Type	**#1 / #2 / #5 Entry (Sensor Option)** **Model**
DIFFUSION	GSA-11 E / G
FLOW METHOD	GSA-11 E / G (Flow Adapter)
REMOTE	GSA(JUNCTION BOX) INTEGRATED TYPE (GSA-11E/G)
When selecting the Triple Sensor option,The Hartport option cannot be selected.	

11.2. GFU-B1 PIPE FLANGE_HORIZONTAL_(GSA SENSOR-SERIES)



[Figure 25. GFU-B1_PIPE FLANGE_HORIZONTAL_(GSA SENSOR-SERIES) DIMENSION]

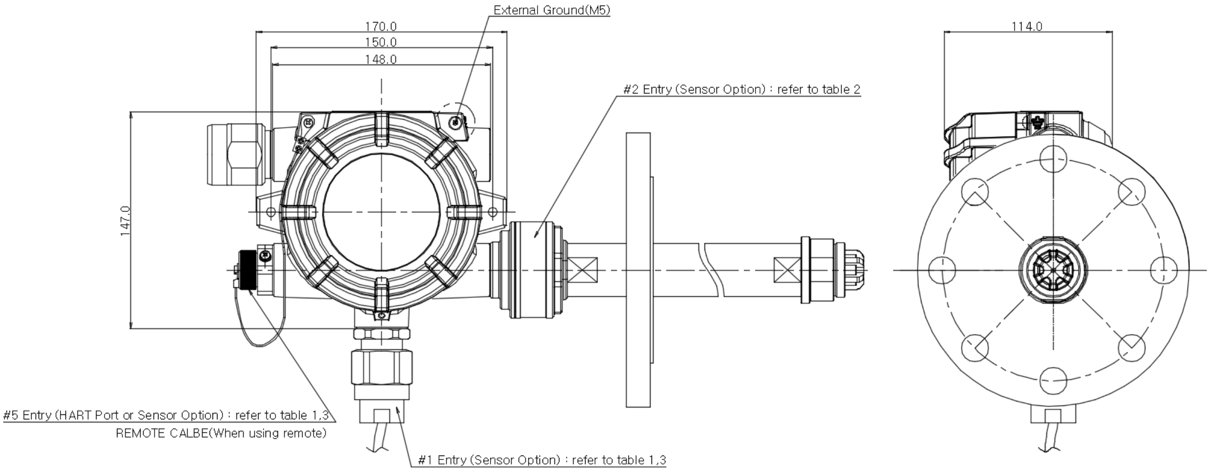
* Max. Triple sensor combination

Table 1 : Remote(Junction Box) / Integrated Installaion (dual)	
Type	**#1 / #5 Entry (Sensor Option)** **Model**
REMOTE	GSA(JUNCTION BOX) INTEGRATED TYPE (GSA-SENSOR-SERIES)
	GSA(JUNCTION BOX) PIPE FLANGE (GSA-SENSOR-SERIES)
	GSA(JUNCTION BOX) PIPE FLANGE (GSA-SENSOR-10S)
DIFFUSION	GSA-11 E / G
	GSA-10 C
	GSA-20 R / B
FLOW METHOD	GSA-11 E / G (Flow Adapter)
	GSA-10 C (Flow Adapter)
	GSA-20 R / B
HART PORT (#5 Entry only)	GFHO-BP1(HART PORT)

Table 2 : Pipe flange Measurement type (dual)	
Type	**#2 Entry (Sensor Option)** **Model**
PIPE FLANGE	GSA-11 E / G
	GSA-20 R / B

Table 3 : Remote(Junction Box) / Integrated Installaion (Triple)	
Type	**#1 / #5 Entry (Sensor Option)** **Model**
DIFFUSION	GSA-11 E / G
FLOW METHOD	GSA-11 E / G (Flow Adapter)
REMOTE	GSA(JUNCTION BOX) INTEGRATED TYPE (GSA-11E/G)
When selecting the Triple Sensor option,The Hartport option cannot be selected.	

11.3. GFU-B1 PIPE FLANGE_HORIZONTAL_(GSA SENSOR-10S)



[Figure 26. GFU-B1_PIPE FLANGE_HORIZONTAL_(GSA SENSOR-10S) DIMENSION]

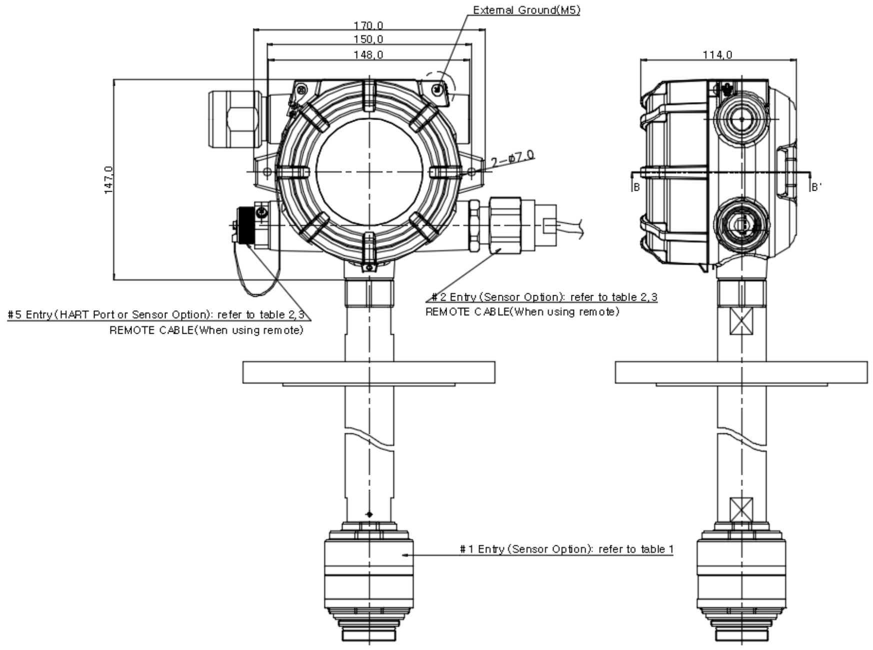
* Max. Triple sensor combination

Table 1 : Remote(Junction Box) / Integrated Installaion (dual)	
Type	**#1 / #5 Entry (Sensor Option) Model**
REMOTE	GSA(JUNCTION BOX) INTEGRATED TYPE (GSA-SENSOR-SERIES)
	GSA(JUNCTION BOX) PIPE FLANGE (GSA-SENSOR-SERIES)
	GSA(JUNCTION BOX) PIPE FLANGE (GSA-SENSOR-10S)
DIFFUSION	GSA-11 E / G
	GSA-10 C
	GSA-20 R / B
FLOW METHOD	GSA-11 E / G (Flow Adapter)
	GSA-10 C (Flow Adapter)
	GSA-20 R / B
HART PORT (#5 Entry only)	GFHO-BP1(HART PORT)

Table 2 : Pipe flange Measurement type (dual)	
Type	**#2 Entry (Sensor Option) Model**
PIPE FLANGE	GSA-10 S

Table 3 : Remote(Junction Box) / Integrated Installaion (Triple)	
Type	**#1 / #5 Entry (Sensor Option) Model**
DIFFUSION	GSA-11 E / G
FLOW METHOD	GSA-11 E / G (Flow Adapter)
REMOTE	GSA(JUNCTION BOX) INTEGRATED TYPE (GSA-11E/G)
When selecting the Triple Sensor option,The Hartport option cannot be selected.	

11.4. GFU-B1 PIPE FLANGE_(GSA SENSOR-SERIES)



[Figure 27. GFU-B1 PIPE FLANGE_(GSA SENSOR-SERIES) DIMENSION]

* Max. Triple sensor combination

oc

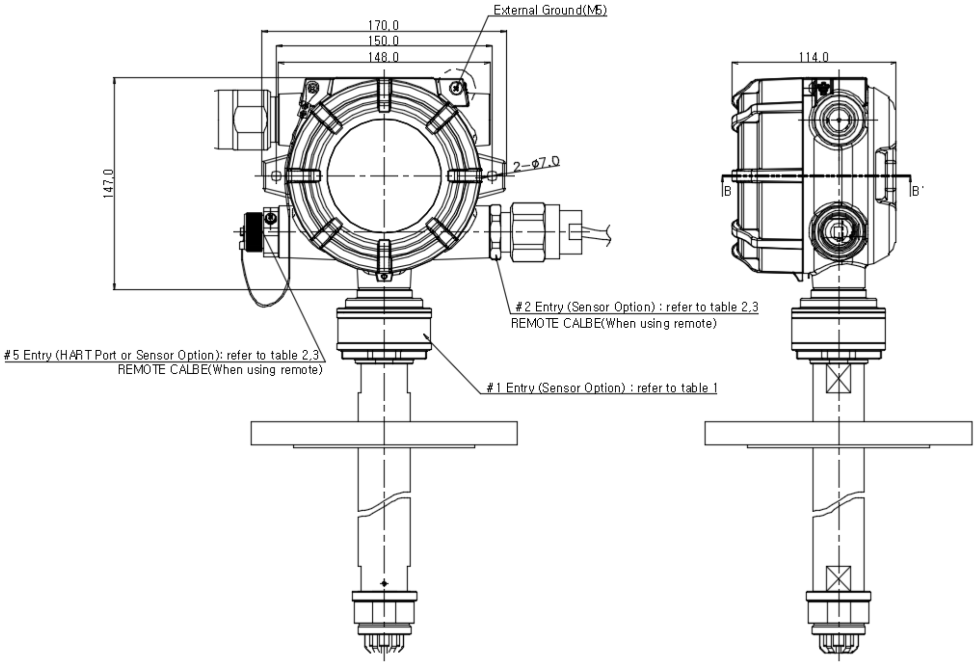
Table 1 : Pipe flange Measurement type (dual)	
Type	**#1 Entry (Sensor Option) Model**
PIPE FLANGE	GSA-11 E / G
	GSA-20 R / B

Table 2 : Remote(Junction Box) / Integrated Installaion (dual)	
Type	**#2 / #5 Entry (Sensor Option) Model**
REMOTE	GSA(JUNCTION BOX) INTEGRATED TYPE (GSA-SENSOR-SERIES)
	GSA(JUNCTION BOX) PIPE FLANGE (GSA-SENSOR-SERIES)
	GSA(JUNCTION BOX) PIPE FLANGE (GSA-SENSOR-10S)
DIFFUSION	GSA-11 E / G
	GSA-10 C
	GSA-20 R / B
FLOW METHOD	GSA-11 E / G (Flow Adapter)
	GSA-10 C (Flow Adapter)
	GSA-20 R / B
HART PORT (#5 Entry only)	GFHO-BP1(HART PORT)

Table 3 : Remote(Junction Box) / Integrated Installaion (Triple)	
Type	**#2 / #5 Entry (Sensor Option) Model**
DIFFUSION	GSA-11 E / G
FLOW METHOD	GSA-11 E / G (Flow Adapter)
REMOTE	GSA(JUNCTION BOX) INTEGRATED TYPE (GSA-11E/G)
When selecting the Triple Sensor option,The Hartport option cannot be selected.	

oc

11.5. GFU-B1 PIPE FLANGE_(GSA SENSOR-10S)



[Figure 28. GFU-B1 PIPE FLANGE_(GSA SENSOR-10S) DIMENSION]

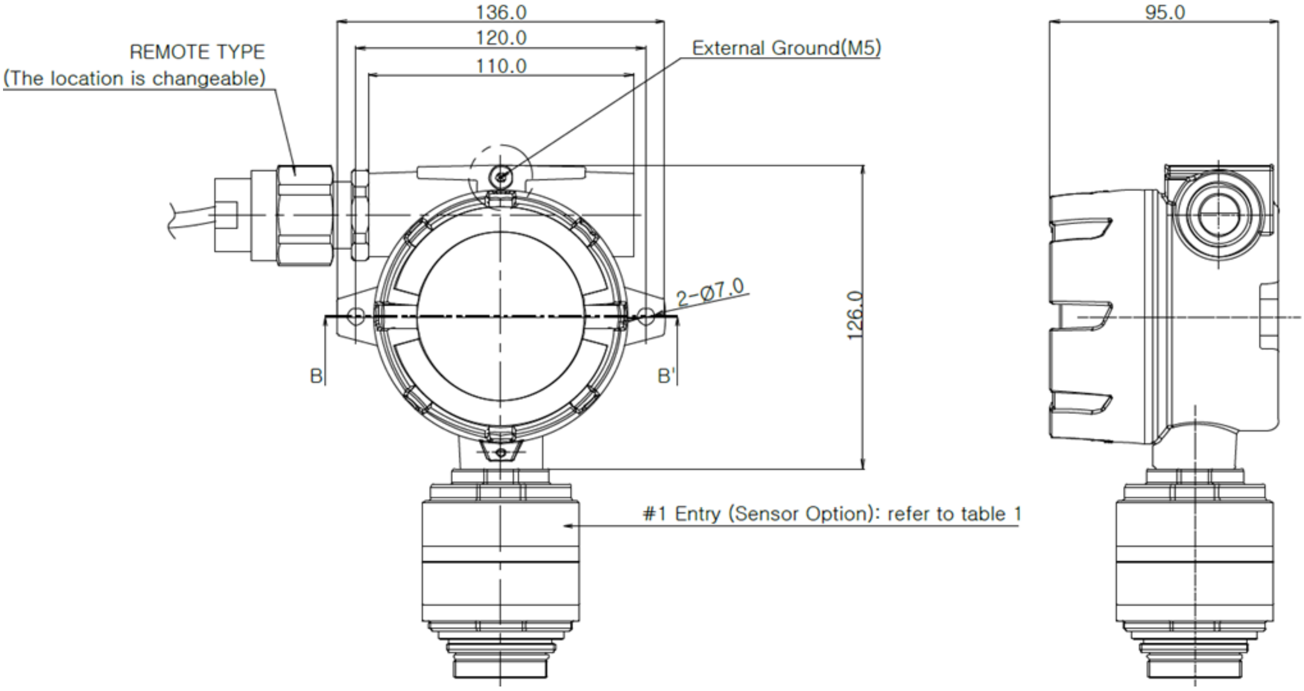
* Max. Triple sensor combination

Table 1 : Pipe flange Measurement type (dual)	
Type	**#1 Entry (Sensor Option) Model**
PIPE FLANGE	GSA-10 S

Table 2 : Remote(Junction Box) / Integrated Installaion (dual)	
Type	**#2 / #5 Entry (Sensor Option) Model**
REMOTE	GSA(JUNCTION BOX) INTEGRATED TYPE (GSA-SENSOR-SERIES)
	GSA(JUNCTION BOX) PIPE FLANGE (GSA-SENSOR-SERIES)
	GSA(JUNCTION BOX) PIPE FLANGE (GSA-SENSOR-10S)
DIFFUSION	GSA-11 E / G
	GSA-10 C
	GSA-20 R / B
FLOW METHOD	GSA-11 E / G (Flow Adapter)
	GSA-10 C (Flow Adapter)
	GSA-20 R / B
HART PORT (#5 Entry only)	GFHO-BP1(HART PORT)

Table 3 : Remote(Junction Box) / Integrated Installaion (Triple)	
Type	**#2 / #5 Entry (Sensor Option) Model**
DIFFUSION	GSA-11 E / G
FLOW METHOD	GSA-11 E / G (Flow Adapter)
REMOTE	GSA(JUNCTION BOX) INTEGRATED TYPE (GSA-11E/G)
When selecting the Triple Sensor option,The Hartport option cannot be selected.	

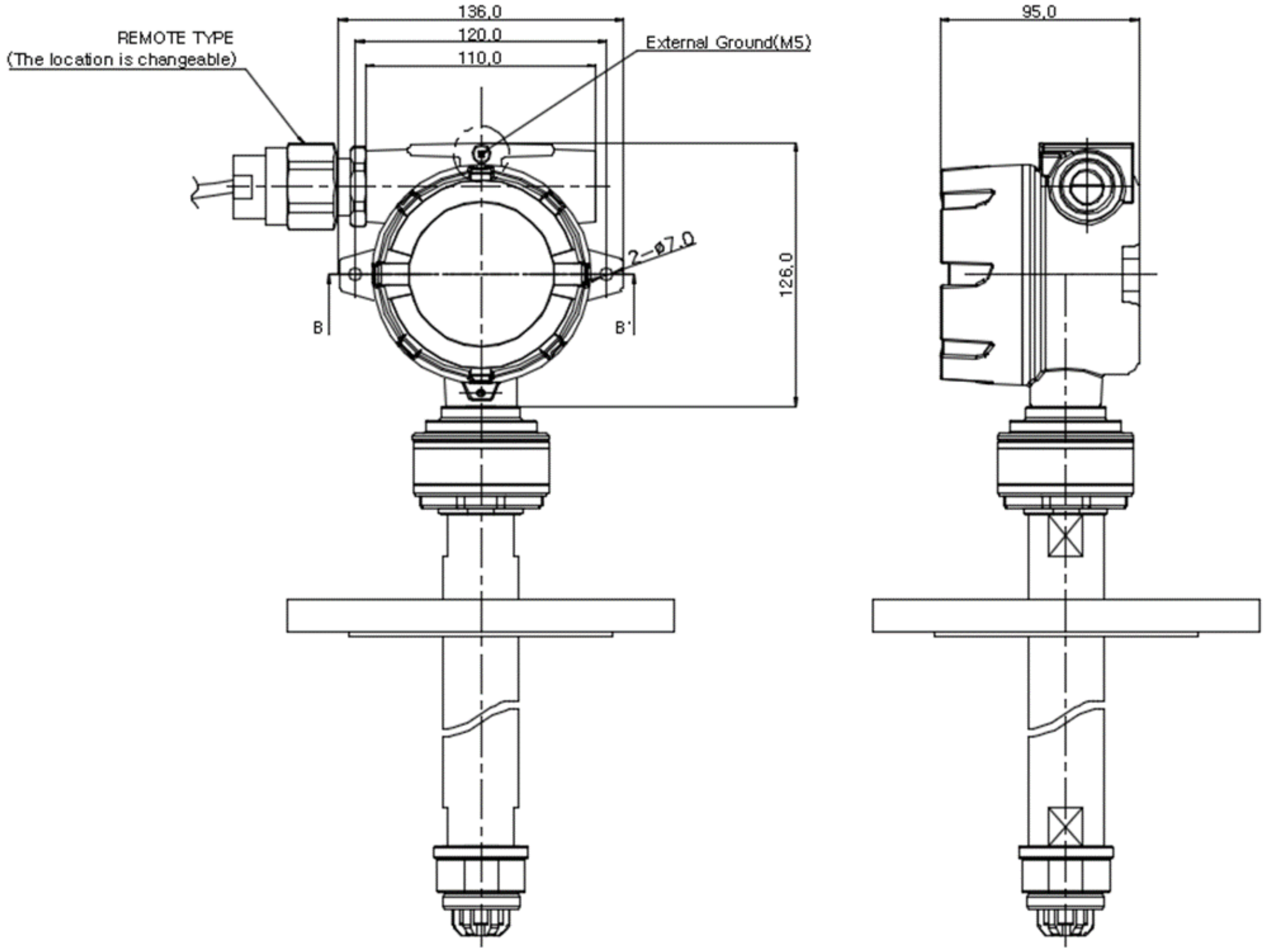
11.6. GSA-JB1(JUNCTION BOX)_INTEGRATED TYPE(GSA SENSOR-SERIES)



[Figure 29. GSA-JB1(JUNCTION BOX)_INTEGRATED TYPE(GSA SENSOR-SERIES) DIMENSION]

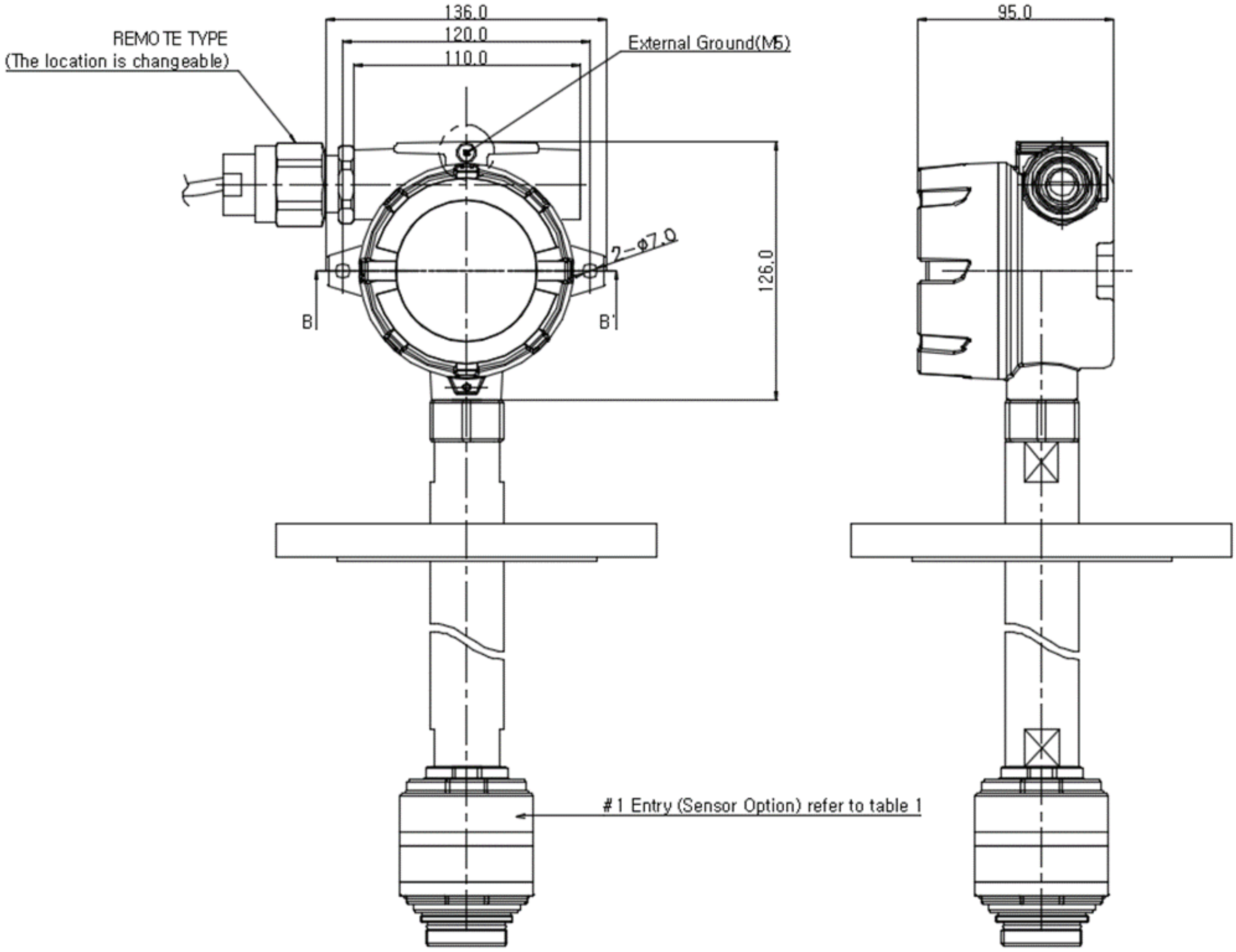
Table 1	
Type	**#1 Entry (Sensor Option) Model**
DIFFUSION	GSA-11 E / G
	GSA-10 C
	GSA-20 R / B
FLOW METHOD	GSA-11 E / G (Flow Adapter)
	GSA-10 C (Flow Adapter)
	GSA-20 R / B

11.7. GSA-JB1(JUNCTION BOX)_PIPE FLANGE_(GSA SENSOR-10S)



[Figure 30. GSA-JB1(JUNCTION BOX)_PIPE FLANGE_(GSA SENSOR-10S) DIMENSION]

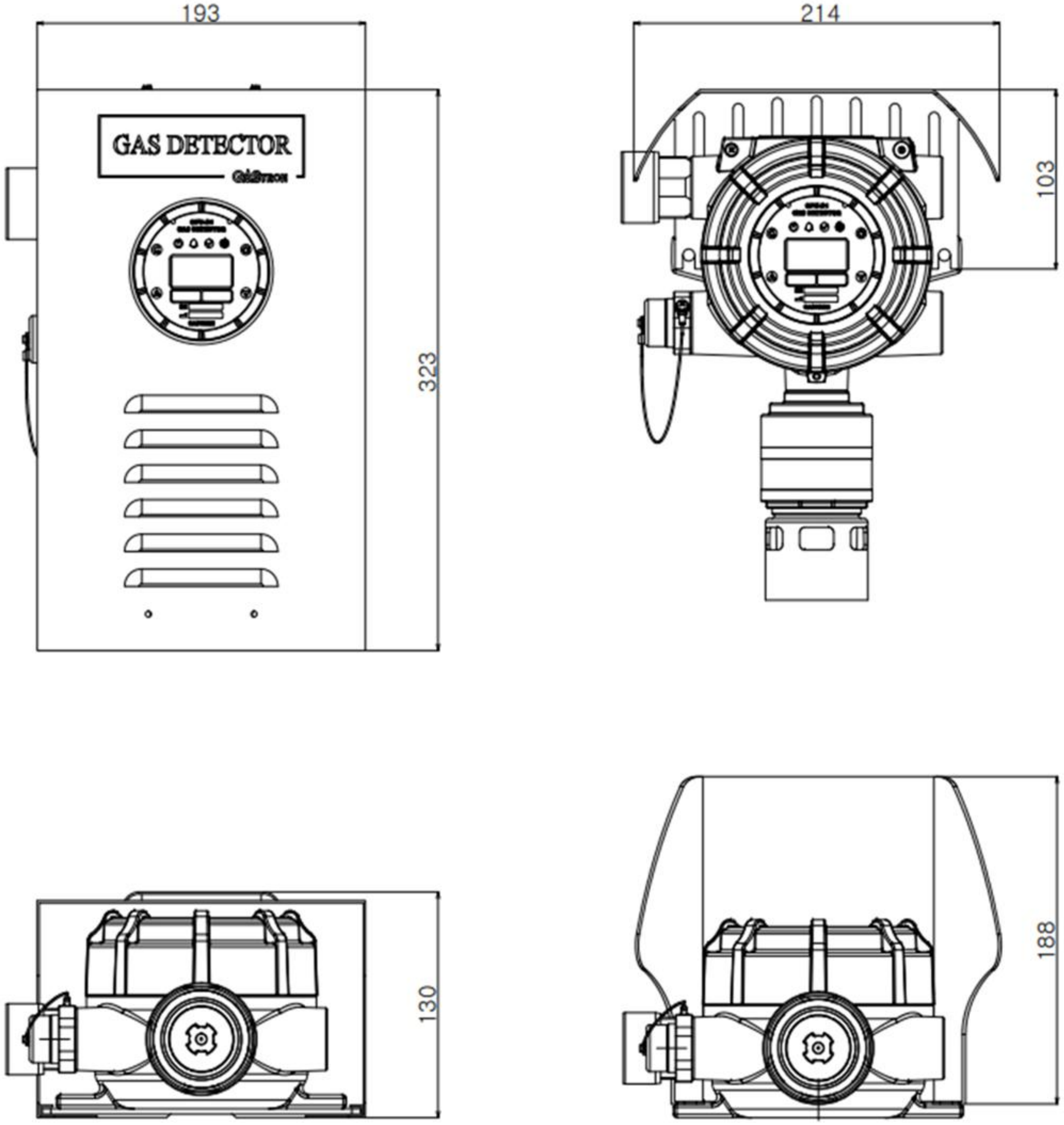
11.8. GSA-JB1(JUNCTION BOX)_PIPE FLANGE_(GSA SENSOR- SERIES)



[Figure 31. GSA-JB1(JUNCTION BOX)_PIPE FLANGE_(GSA SENSOR-SERIES) DIMENSION]

Table 1	
Type	**#1 Entry (Sensor Option) Model**
PIPE FLANGE	GSA-11 E / G
	GSA-20 R / B

11.9. GFU-B1_SUN SHIELD (OPTION)



[Figure 32. GFU-B1_SUN SHIELD DIMENSION]

12. Caution before installation

12.1. Selection of installation location

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

- 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.
- Locations where gas is easy to stay around manufacturing equipments with ignition source like heaters.
- Around connections of equipments for filling combustible and toxic substances.
- Substations, distribution panel rooms, control rooms, etc. near explosion-proof area.
- Other places where gas is particularly prone to stay.

12.2. Selection of installation position

The Gas Detector of the Gas Leak Detection Alarm System should be installed as close as possible to the leak area where gas leakage is likely. However, although direct gas leakage is not expected, where gas leaked from the surrounding area is likely to stay, it should be installed in like the following positions.

- 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.
- A gas leak detection alarm installed outside buildings should be installed at position where gas is likely to stay, taking into account wind direction, wind speed, and specific gravity of gas.
- A gas leak detection alarm installed inside a building should be installed at the lower part of the building if the specific gravity of the gas to be detected is heavier than air, and at the upper part of the building or near the ventilation openings of the building if the specific gravity of the gas to be detected is lighter than air.

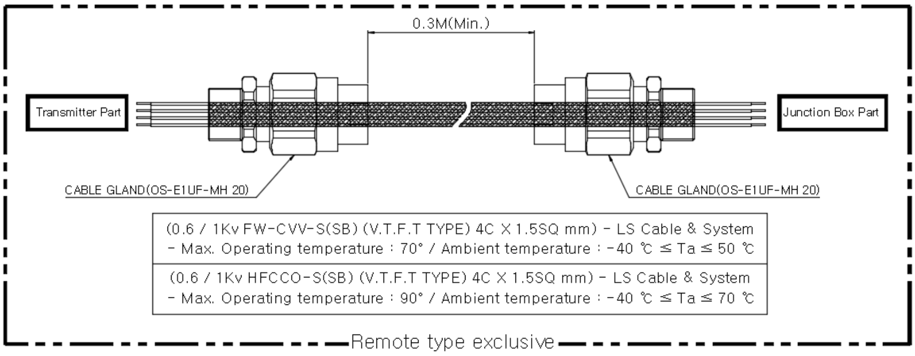
The alarm of the gas leak detection alarm should be installed where workers reside.

12.3. Precaution at the time of Installation

Installation should be avoided in locations where there are elements that may cause electrical problems, such as rainwater. Since periodic maintenance is required, it is recommended to install in a location where maintenance work is easy. Places subject to vibration or impact may affect the output value, so avoid installing in places subject to vibration or impact, and install the sensor so that it faces the direction of gravity.

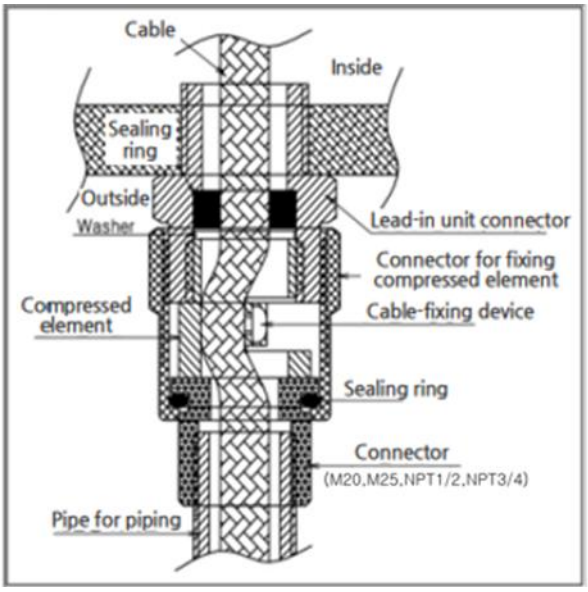
⚠ WARNING

- This product has flameproof enclosures (and, depending on the sensor combination or selected output option, intrinsic safety composite) explosion-proof structure and is approved for use in areas where gases, vapors and mists classified as atmosphere groups IIA, IIB or IIC may be present, from general workshops and chemical plants, etc., and is approved to use limited at hazardous zones categorized as Zone 1 or Zone 2.
- Explosion-proof protection type for gases, vapors or mists: Ex db or Ex db ia [ia Ga] or Ex db ia IIC T6,T5,T4 Gb (depending on equipment configuration combination)
- Explosion-proof protection type for combustible dusts: Ex tb IIIC T80℃/ T90℃/ T100℃ Db
- Allowable ambient temperature is in the range of -40℃ to 40℃ or 60℃ or 70℃ or 75℃ or 80℃ (depending on Ex protection type and temperature class according to equipment configuration combination)
- Installation elevation: less than 1,000 M above sea level
- Relative Humidity: 5-99%
- Installation place: indoors or outdoors
- The impact tests carried out on the glass windows were at 2J, therefore this equipment shall only be installed in locations where there is a low risk of impact damage.
- When used in the presence of combustible dust, the end user shall remove the dust regularly to prevent the accumulation of the dust on the external surface of the housing, however it shall not be swept by compressed air.
- Splash guard for GSA-10C can generate ignitable electrostatic, so clean only with a damp cloth during maintenance.
- When opening the transmitter enclosure, make sure there is no explosive gas, then open it with a damp cloth.
- Ensure that the cable & cable gland are rated for at least 20 degrees above the maximum ambient temperature when making cable & cable gland selection.
- When installing the remote type, follow Figure 33 or install in accordance with IEC 60079-14 standards.

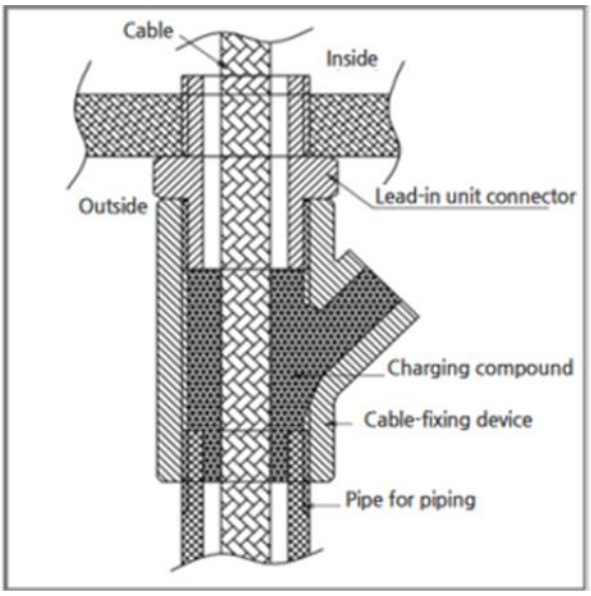


[Figure 33. Remote type_cable & cable gland]

- When installing the flow method type, do not install the piping in a place where explosive gas is continuously present.
- When installing the flow method type, high pressure may be applied to the piping, so do not install at high temperatures.
- The wire conduit should be sealed to prevent the gases, etc. from moving or the explosion flame propagation through the conduit under 50mm 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 product 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].
- All materials used for cable entry, such as CABLE GLANDs and SEALING FITTINGs, and all materials used for finishing unused entry areas must be only products that have qualified materials.

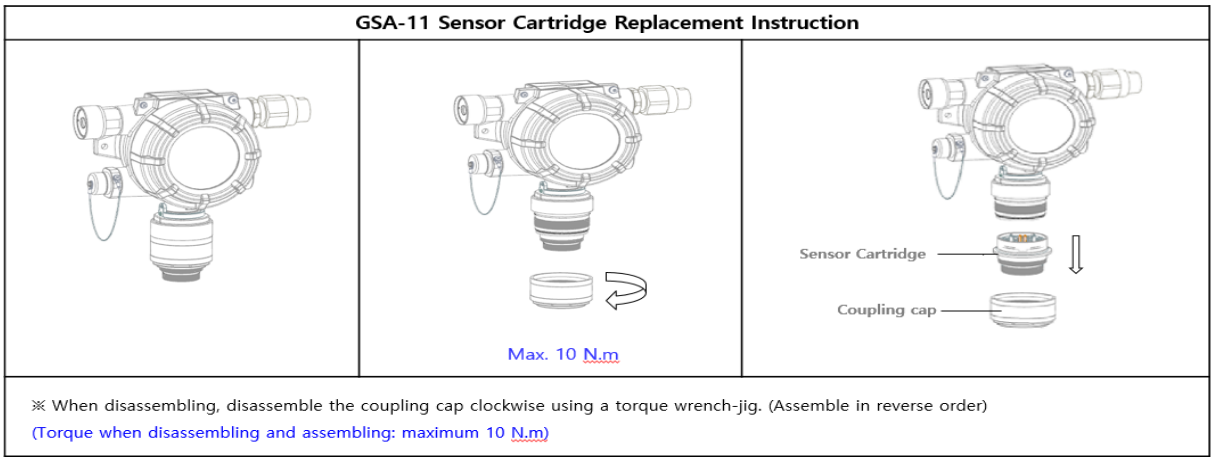


[Figure 34. Pressure packing type]



[Figure 35. Y Sealing Compound]

- When replacing a GSA-11 Intrinsically Safe Cartridge Sensor in an explosive atmosphere, the replacement instructions in Figure 36 must be met.



[Figure 36. Sensor Cartridge Replacement Instruction]

13. Product Number Description

1) Universal Gas Detector, GFU-B1

	Transmitter Option		Single Sensor Option		Dual Sensor Option		Triple Sensor Option
GFU-B1 -	1 2 3 4 5	–	6 7 8 9 10	–	11 12 13 14 15	–	16 17 18 19 20

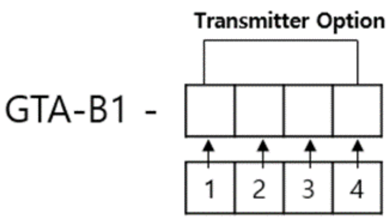
Classification	Configuration
GFU-B1	Universal Gas Detector / Complete Model

Universal Transmitter, GTA-B1 options		
1	Material	A: Aluminum , S: Stainless
2	Port	1 : M20(Default) / 2 : M25 / 3 : NPT1/2 / 4 : NPT3/4 5 : PF1/2(KCs Only) / 6 : PF3/4(KCs Only)
3	Output ※ When selecting the Triple Sensor option, The Hartport option cannot be selected.	S : Single 4-20mA H : Single 4-20mA , HART Board P : Single 4-20mA , HART Board , HART Port R : Single RS485 Board D : Dual 4-20mA U : Dual 4-20mA , HART Board Y : Dual 4-20mA , HART Board , HART Port T : Dual RS485 Board
4	Relay	X : None / R : Relay
5	Approvals	A : ATEX / IECEx / N : NEPSI / K : KCs

Smart Sensor Module, GSA Sensor options			
6	Ch1 Single Sensor	Installation	A : Integrated / R : Remote(Junction Box)
7		Sensor Entry Number	1 : #1 Entry, 2 : #2 Entry, 3 : #5 Entry ※ When HART Port output option is selected, sensor cannot be applied at #5 Entry, another Entry must be selected.
8		Sensor type	E : 11(Toxic Electrochemical) / G : 11(Oxygen Electrochemical) / R : 20(NDIR)-2Beam / B : 20(NDIR)-4Beam / C : 10(Catalytic Bead) / S : 10(Catalytic Bead, Pipe flange Only)
9		Detecting Method Type	D : Diffusion / F : Flow / P : Pipe flange(Diffusion)
10		Gas type	*** : [A~Z][01~99] (Gas selection number)
11	Ch2 Dual Sensor	Installation	X(Empty) : None / A : Integrated / R : Remote(Junction Box)
12		Sensor Entry Number	X(Empty) : None / 1 : #1 Entry, 2 : #2 Entry, 3 : #5 Entry ※ When HART Port output option is selected, sensor cannot be applied at #5 Entry, another Entry must be selected.
13		Sensor type	X(Empty) : None E : 11(Toxic Electrochemical) / G : 11(Oxygen Electrochemical) / R : 20(NDIR)-2Beam / B : 20(NDIR)-4Beam / C : 10(Catalytic Bead) / S : 10(Catalytic Bead, Pipe flange Only)
14		Detecting Method Type	X(Empty) : None / D : Diffusion / F : Flow / P : Pipe flange(Diffusion)
15		Gas type	XXX(Empty) : None / *** : [A~Z][01~99] (Gas selection number)

16	Ch3 Triple Sensor	Installation	X : None / A : Integrated / R : Remote(Junction Box)
17		Sensor Entry Number	X(Empty) : None ,1 : #1 Entry, 2 : #2 Entry, 3 : #5 Entry
18		Sensor type	X : None E : 11(Toxic Electrochemical) / G : 11(Oxygen Electrochemical)
19		Detecting method type	X : None / D : Diffusion / F : Flow / P : Pipe flange(Diffusion)
20		Gas type	XXX : None / *** : [A~Z][01~99] (Gas selection number)

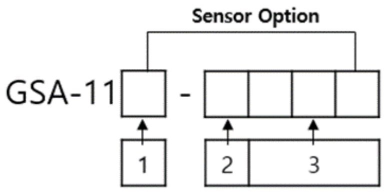
2) Universal Transmitter



Classification		Configuration
GTA-B1		Universal Transmitter / Module
GTA-B1 Configure options		
1	Material	A: Aluminum , S: Stainless
2	Port	1 : M20(Default) / 2 : M25 / 3 : NPT1/2 / 4 : NPT3/4 5 : PF1/2(KCs Only) / 6 : PF3/4(KCs Only)
3	Output ※ When selecting the Triple Sensor option, The Hartport option cannot be selected.	S : Single 4-20mA H : Single 4-20mA , HART Board P : Single 4-20mA , HART Board , HART Port R : Single RS485 Board D : Dual 4-20mA U : Dual 4-20mA , HART Board Y : Dual 4-20mA , HART Board , HART Port T : Dual RS485 Board
4	Relay	X : None / R : Relay

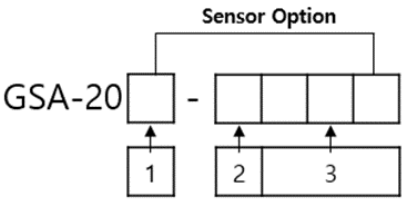
3) Smart Sensor Module

3-1) GSA-11 Sensor Option



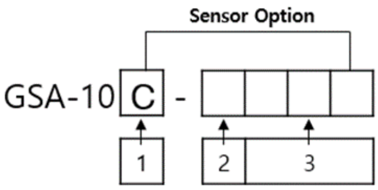
Classification		Configuration
GSA-11		Flameproof & intrinsic safety explosion-proof smart sensor / Module
Sensor Configure options		
1	Sensor type	E : Toxic Electrochemical Sensor G : Oxygen Electrochemical Sensor
2	Detecting Method type	D : Diffusion / F : Flow / P : Pipe flange (Diffusion)
3	Gas type	*** : [A~Z][01~99] (Gas selection number)

3-2) GSA-20 Sensor Option



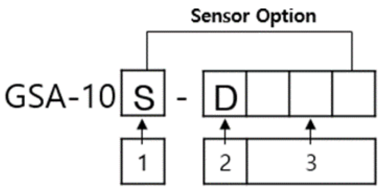
Classification		Configuration
GSA-20		Flameproof smart sensor / Module
Sensor Configure options		
1	Sensor type	R : NDIR Sensor (2Beam type) - Default B : NDIR Sensor (4Beam type) - Option
2	Detecting Method type	D : Diffusion / F : Flow / P : Pipe flange (Diffusion)
3	Gas type	*** : [A~Z][01~99] (Gas selection number)

3-3) GSA-10C Sensor Option



Classification		Configuration
GSA-10		Flameproof smart sensor / Module
Sensor Configure options		
1	Sensor type	C : Catalytic Bead Sensor
2	Detecting Method type	D : Diffusion / F : Flow
3	Gas type	*** : [A~Z][01~99] (Gas selection number)

3-4) GSA-10S Sensor Option



Classification		Configuration
GSA-10		Flameproof smart sensor / Module
Sensor Configure options		
1	Sensor type	S : Catalytic Bead Sensor (Pipe flange Only)
2	Detecting Method type	D : Diffusion
3	Gas type	*** : [A~Z][01~99] (Gas selection number)

3-4) Accessories Option

Classification		Configuration
1	GTA-B1 (Universal Transmitter)	1. **GTL-150 (Buzzer)** : This accessory becomes an explosion-proof component attached to the flameproof enclosure of the universal transmitter, GTA-B1. 2. **ARCV-B1 (Sun Shield)** : This accessory is used to protect the universal transmitter, GTA-B1 from direct sunlight. It does not affect explosion-proof performance.
2	GSA-10S (Catalytic Bead Sensor)	1. **SPG-500 (Splash Guard)**: This accessory is used to protect the GSA-10S Smart Sensor Module from splashes penetration of rain or water and it is installed basically. It does not affect explosion-proof performance. 2. **CALC-300 (Calibration cap)** : This accessory is used for dedicated calibration of the GSA-10S Smart Sensor Module. It does not affect explosion-proof performance.
3	GSA-10C (Catalytic Bead Sensor)	1. **ASPG-10 (Splash Guard)**: This accessory is used to protect the smart sensor, GSA-10C Smart Sensor Module or GSA-11 series from splashes penetration of rain or water and it is installed basically. It does not affect explosion-proof performance. 2. **AGSAT-10 (Flow Adapter)** : This accessory is used for flow method type. It does not affect explosion-proof performance. 3. **ARCV-10 (Sun Shield)** : This accessory is used to protect the smart sensor series from direct sunlight. It does not affect explosion-proof performance. 4. **ACALC-10 (Calibration cap)** : This accessory is used for calibration of the smart sensor, GSA-11 series or GSA-10C Smart Sensor Module. It does not affect explosion-proof performance.
4	GSA-20(R / B) (NDIR Sensor)	1. **ADTF-20 (Dust Mesh Filter)** : This accessory is used to prevent dust penetration for the smart sensor, GSA-20 series. It is a required component when dust explosion-proof certification is required, and in other cases, it is a user-selected optional component. This accessory is not used for flow method type. 2. **ARCV-10 (Sun Shield)** : This accessory is used to protect the smart sensor series from direct sunlight. It does not affect explosion-proof performance. 3. **ACALC-20 (Calibration cap)** : This accessory is used for dedicated calibration (wind cap) of the smart sensor, GSA-20 series. It does not affect explosion-proof performance.

5	GSA-11(E / G) (Electrochemical Sensor)	1. **ADTC-11 (Dust Cap - Membrane filter)** : This accessory is used to prevent dust penetration for the smart sensor, GSA-11 series. It is a required component when dust explosion-proof certification is required, and in other cases, it is a user-selected optional component. 2. **ASPG-10 (Splash Guard)** : This accessory is used to protect the smart sensor, GSA-11 series or GSA-10C Smart Sensor Module from splashes penetration of rain or water and it is installed basically. It does not affect explosion-proof performance. 3. **AGSAT-11 (Flow Adapter)** : This accessory is used for flow method type. It does not affect explosion-proof performance. 4. **ARCV-10 (Sun Shield)** : This accessory is used to protect the smart sensor series from direct sunlight. It does not affect explosion-proof performance. 5. **ACALC-10 (Calibration cap)** : This accessory is used for calibration of the smart sensor, GSA-11 series or GSA-10C Smart Sensor Module. It does not affect explosion-proof performance.

14. Certifications and Approvals

14.1. Explosion-proof information for each configuration

The explosion-proof protection type and the range of ambient temperatures in which explosion -proof performance can be maintained will differ depending on configuration combination.

Refer to the following explosion-proof information for each configuration combination.

The '*' mark of the Product Number in the table below means that any selection may be made for the relevant option item.

Product Number	Ex Protection Type	Ambient temperature
GFU-B1 - **S(or H or D or U or R or T)** - **R(or B or C or S)**** **GFU-B1** - **S(or H or D or U or R or T)** - **R(or B or C or S)**** - **R(or B or C or S)****	Ex **db** IIC T6 / T5 / T4 Gb	-40 ℃ ≤Ta ≤**60 ℃ : T6** -40 ℃ ≤Ta ≤70 ℃ : T5 -40 ℃ ≤Ta ≤80 ℃ : T4
GFU-B1 - **S(or H or D or U or R or T)**- **E(or G)**** **GFU-B1** - **S(or H or D or U or R or T)**- **E(or G)**** - ******* **GFU-B1** - **S(or H or D or U or R or T)**- **E(or G)**** - ******* - *******	Ex **db ia** IIC T6 / T5 / T4 Gb	-40 ℃ ≤Ta ≤**40 ℃ : T6** -40 ℃ ≤Ta ≤70 ℃ : T5 -40 ℃ ≤Ta ≤80 ℃ : T4
GFU-B1 - **P(or Y)** - **R(or B or C or S)**** **GFU-B1** - **P(or Y)** - **R(or B or C or S)**** - **R(or B or C or S)****	Ex **db ia [ia Ga]** IIC T6 / T5 / T4 Gb	-40 ℃ ≤Ta ≤**60 ℃ : T6** -40 ℃ ≤Ta ≤70 ℃ : T5 -40 ℃ ≤Ta ≤80 ℃ : T4
GFU-B1 - **P(or Y)** - **E(or G)**** **GFU-B1** - **P(or Y)** - **E(or G)**** - ******* **GFU-B1** - **P(or Y)** - **E(or G)**** - ******* - *******	Ex **db ia [ia Ga]** IIC T6 / T5 / T4 Gb	-40 ℃ ≤Ta ≤**40 ℃ : T6** -40 ℃ ≤Ta ≤70 ℃ : T5 -40 ℃ ≤Ta ≤80 ℃ : T4
GFU-B1 - ***** - **R(or B or C or S)**** **GFU-B1** - ***** - **R(or B or C or S)**** - **R(or B or C or S)****	Ex **tb** IIIC T80℃ / T90℃ / T100℃ Db	-40 ℃ ≤Ta ≤60 ℃ : T 80 ℃ -40 ℃ ≤Ta ≤70 ℃ : T 90 ℃ -40 ℃ ≤Ta ≤**80 ℃ : T 100 ℃**
GFU-B1 - ***** - **E(or G)**** **GFU-B1** - ***** - **E(or G)**** - ******* **GFU-B1** - ***** - **E(or G)**** - ******* - *******	Ex **tb** IIIC T80℃ / T90℃/ T100℃ Db	-40 ℃ ≤Ta ≤60 ℃ : T 80 ℃ -40 ℃ ≤Ta ≤70 ℃ : T 90 ℃ -40 ℃ ≤Ta ≤**75 ℃ : T 100 ℃**

14.2. Approvals and Related Standards

Approvals		Related Standards
Certification	Certificate Number	
IECEx	IECEx KTL 24.0000X	IEC 60079-0 : 2017, IEC 60079-1 : 2014, IEC 60079-11 : 2011, IEC 60079-31 : 2022
ATEX	DEKRA 24ATEX0114X	EN IEC 60079-0 : 2018, EN 60079-1 : 2014, EN 60079-11 : 2012, EN 60079-31 : 2014, IEC 60079-31 : 2022
NEPSI	GYJ24.0000	GB/T 3836.1-2021, GB/T 3836.2-2021, GB/T 3836.4-2021, GB/T 3836.31-2021
KCs	24-KA2BO-0000X	Announcement No. 2021-22 of Ministry of Employment and Labor
KC	R-C-X00-GFU-B1	Announcement No. 2023-13 of National Radio Research Agency

15. Appendix 1

Gas Type		Smart Sensor Module	Explosion range (VOL%)	Relative Sensitivity LEL% (CH_4)
Methane	CH_4	GSA-10C	5.0	100
Propane	C_3H_8	GSA-10C	2.2	80
iso-Butane	C_4H_{10}	GSA-10C	1.8	80
n-Pentan	C_5H_{12}	GSA-10C	1.4	80
n-Hexane	C_6H_{14}	GSA-10C	1.2	75
n-Heptane	C_7H_{16}	GSA-10C	1.05	65
iso-Octane	C_8H_{18}	GSA-10S	0.95	60
Methanol	CH_3OH	GSA-10C	6.7	130
Ethanol	C_2H_5OH	GSA-10C	3.3	95
Acetone	C_3H_6O	GSA-10C	2.6	85
Toluene	C_7H_8	GSA-10C	1.2	70
Ethyl Acetate	$C_4H_8O_2$	GSA-10C	2.2	75
Ammonia	NH_3	GSA-10C	15	150
Cyclohexane	C_6H_{12}	GSA-10C	1.3	75
Ethylene	C_2H_4	GSA-10C	2.7	95

16. Revision History

Version	Contents	Date
0.1	* Initial revision of manual	2023.09.12
0.2	* Manual modification.	2024.08.02
0.3	* Manual modification (Modify ATEX.)	2025.01.02